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EDITORIAL NOTES—GAS, &c.

The Brake of Extraordinary Circumstances.

IN April, the Gaslight and Coke Company will complete a century's existence and work from the time of the granting of their Charter in 1812. In this year 1912, the proprietors have reason to be proud of the position of the huge concern—prouder than a few short years since they could have possibly been. To-day the Company are selling gas throughout their extensive area at 2s. 6d. per 1000 cubic feet; and it is only necessary to go back to 1907 to reach the time when 2s. 11d. per 1000 cubic feet was being charged. Seeing that, speaking in round numbers, 1d. represents to the consumers about £100,000 a year, an approximate estimate can readily be made of what London North of the Thames is now paying less for its gas supply than would have been the case if the 2s. 11d. price had continued to prevail. Upon all this concession, the financial position of the undertaking is stronger than ever it was. The real seats of improvement that have brought these things to pass have been internal rather than external. The past half year, however, though it has yielded a financial result that enables the dividend to be paid, and to add £27,398 to the carry-forward, does not, through various adverse circumstances, contribute so much to the rate of progress as several of its immediate predecessors. It cannot be expected that the high-water mark of internal improvement can always be maintained, when external resistance is offered, half year by half year; and besides there are limits to this as to other things. The protracted hot summer has affected the consumption of gas. During the sultry weeks, people got out of London as much as possible, and those who were in London spent as much as they could of the cooler part of the evening out of doors. What the gas suppliers of London lost in this regard, the gas undertakings supplying seaside resorts gained. Then the great strikes of dockers and carters, and of railway men came into the half year, and greatly disorganized business and work in the Company's area. We are not sure too (perhaps there will be an explanation by the Governor, Mr. Corbet Woodall, at the meeting of the proprietors next Friday) that the general unrest that spread so considerably during that period along the banks of the Thames, more especially along the north side, did not have some effect upon the working of a portion of the army of men employed at Beckton. There was, while the turmoil among labour in the vicinity continued and immediately after, a persistent endeavour to foment discord and dissatisfaction among the gas workers; and large employers of labour know the influence of such proceedings when the labour world is in seditious mood. The manufacturing results of the half year, though good, we make out are not quite on a level with those of the corresponding half of 1910.

Then, further, surveying the half year financially, it must be remembered that the price of gas was less by 1d. than in the corresponding half of 1910; and on the year's consumption of gas by private consumers, the 1d. represents about £102,000, or (averaged) £51,000 per half year. The dividends of the ordinary shareholders, too, for the past year are 1s. 4d. per cent. more than in the previous year; and the co-partner employees, with the lower price of gas, receive enhanced reward under the scheme. Then £15,000 in the past half year is going to the redemption fund, against £10,000 in the second half of 1910. All these are matters that have to be taken into account in relation to the profit balance. Though adverse circumstances have been experienced, the total revenue of the half year has been sufficient to meet all the additional charges and obligations, and to give a balance of £27,398 to be added to the £699,350 brought forward, which makes the balance to be carried to the current accounts £726,747, or £101,059 more than it was twelve months ago. This is highly gratifying; and the Directors are well protected by it, in giving the general consumers a further 1d. reduction this half year, although the Board are looking anxiously upon the situation in the coal trade. Incidentally, readers may be reminded that, with the present half year, the Company commence supplying the districts of the late Barking and Chigwell, Loughton, and Woodford Gas Companies—the works hitherto supplying which areas have now been closed down, which is a step in economical supply.

The consumption of gas in the half year decreased by 0·96 per cent., compared with the second half of last year. But inasmuch as the Company put on a 4¾ per cent. increase in the first half of the year, the total private consumption for the year was 24,560,660,000 cubic feet, which is 456,150,000 cubic feet more than in 1910. Even the public lamps, despite preferential treatment for municipal electricity undertakings—also taking the whole year, and not forgetting the higher efficiency lamps now used in the streets—increased their consumption, by 13,886,000 cubic feet, to 924,325,000 cubic feet. Further proof that the abnormal summer and interruption of work by strikes were the causes of the sinking in the output curve is the fact that, in the second half of 1910, the increase in the consumption was 3 per cent. Since then, many thousands of new consumers have been connected to the mains, and many thousands of gas-stoves and gas-fires sold and let on hire—two results being that the capital expenditure in these directions has been considerable, and that the rentals of meters, stoves, and fittings are higher on the half year by £14,346. This, and the additional receipts for residuals (£31,250)—making together £45,596—rendered valuable help in compensating for the loss due to diminished consumption, and the reduced revenue owing to the lower price of gas. As a matter of fact, the revenue received from the sale of gas amounted to £1,582,483, as compared with £1,648,208 in the December half of 1910; so that the difference is £65,725. But in the June half of last year, the gas revenue was higher, in spite of the reduction, by £17,461, than that of the June half of 1910; so that, on the year, while the concession to the consumers represented about £102,000 for the twelvemonth, the receipts for gas are only short of 1910 by £48,264. That the past half year did not do better must be attributed to the extraordinary conditions that marked it, and in certain respects marred it. As we have said, however, rentals of meters, stoves, and fittings, aggregating £200,657, contributed £14,346 more to income; and residuals, totalling to £490,220, produced £31,250 more. The residuals market has served the gas industry well continuously now for some years; and in every line the half-year's receipts of the Company in this department have floated to higher levels. Coke yielded £296,859, or £10,318 more; breeze, £22,358, or £3046 more; tar and tar products, £67,147, or £11,879 more; and ammoniacal liquor and sulphate of ammonia £103,855, or £6006 more. The total receipts of the half year from all sources thus came to £2,278,327, which was only less by £20,996 than in the second half of 1910. The total expenditure, £1,625,979, represented an increase of £18,491; so that, adding this to the reduction of revenue, we have £39,487 representing the sum by which the balance to net revenue account (£652,348) is less than in the second half of 1910. But the gas consumers are the gainers.

Regarding the expenditure of the half year, notable items in which there is variation are few. Costs of materials will

be dealt with presently. The total expenses on manufacture were £972,819, or £6000 less than in the corresponding period of 1910. It will be remembered that the Company with the other Metropolitan Gas Companies, in sympathy with the general upward movement of wages, increased the payments to the men employed at the works; and we have in the manufacturing wages bill of the half year an increase, by £9299, to £106,397. In the distribution department, £337,291 was spent; being £6654 more than in the December half of 1910. But there is nothing remarkable about this, when we consider the increased number of consumers and of meters, stoves, &c., that are out on hire. Rents, rates, and taxes show the substantial increase of £11,675, and amount to £169,622. The co-partners share with the ordinary proprietors and the consumers in the financial prosperity by taking £2000 more than in the December half of 1910; but bad debts are £2000 less.

The manufacturing results, as we have said, though good, are not so favourable as in the corresponding half of the preceding year. The expenditure on coal was £535,426, or £20,089 less, though the consumption of coal (872,382 tons) was 1405 tons more. On oil £47,225 was spent, which was only £140 more, though 186,890 gallons more were used. The coke and breeze employed in manufacture was charged up at £42,530, or £2041 more. So that the several materials required in manufacture together cost less by £17,908. But though 1405 tons more coal were used, the coal gas made —10,331,218,000 cubic feet—was 106,206,000 cubic feet less than in the second half of 1910; the make per ton being 11,842 cubic feet, as against 11,983 cubic feet, or an average drop per ton of 141 cubic feet. The carburetted water gas made amounted to 3,103,996,000 cubic feet, or 61,113,000 cubic feet less. The total quantity of gas sold in the half year was 12,518,777,000 cubic feet, or 120,798,000 cubic feet less. Extraordinary circumstances have produced the two sources of comparative weakness in the half year; but the half year, notwithstanding, shows the Company stronger than ever, and gas being sold at prices never so low in the long history of the concern.

Good Counterbalancing Factors.

FINANCIALLY, and in respect of manufacturing results, the South Metropolitan Gas Company continue to lengthen the distance between present and former conditions. To say that in both respects an excellent showing is made in the half-yearly accounts before us is no exaggeration. The one weak spot in the accounts is that the consumption last half year fell away by 2·45 per cent.; but no gas directorate can compel Old Sol to restrain himself during the summer months, nor can it order less mild conditions in the autumn and the weeks preceding Christmas. The Directors say the decrease in consumption is "owing to the abnormally "mild weather experienced in London." When we cast the mind back to the sweltering weather of the summer months, during which people simply flocked from London, the Directors' statement appears "mild" indeed. But the proprietors can afford to look with equanimity upon the freakish moods of Nature, when they see there are now 353,463 meters connected, against 346,312 twelve months since; when they see 290,203 cooking-stoves fixed, against 281,880; and when they see 33,360 gas-fires on hire, against 29,489—these gas-stoves and fires, of course, not including privately owned ones. The reduction of private consumption was spread fairly evenly over the half year; for we see that in the Michaelmas quarter when little lighting was necessary, the drop in gas receipts was £7556, compared with the corresponding quarter of 1910, and in the three months preceding Christmas the decline was £8819. However, for the abnormal heat last summer, and the abnormal mildness of the opening winter months, the atmospherical conditions during the past week have been trying to offer some compensation; and it would be extremely interesting if the Chairman of the Company (Mr. Charles Carpenter) would trespass upon this half-year's trading at the meeting of the proprietors to-morrow week, and show, by reference to these (for us of late years) abnormally cold days, a comparison of temperature effects upon consumption.

To put the reduction of consumption into solid figures for the half year, the total quantity of gas sold was 6,147,935,000 cubic feet, which was less than the second half of 1910 by 154,811,000 cubic feet; and it is interesting to note that of this private consumers took 151,941,000 cubic feet less, and public lamps 2,870,000 feet less. The latter figure is interesting, because it indicates the saving in consumption by the "Metro" inverted burners that have been largely adopted for street lighting in South London; and it is probable that there were fewer dark days. Now, if these conditions affect consumption in street-lamps, how much more must they be inimical to large consumption in private houses, shops, offices, and factories? The reduction in consumption for street lighting can be due to no other reason; seeing that the 24,391 public lamps in the Company's area represent an increase of 133. In connection with these figures, there has, for some years past, been an annoying little one in the accounts, which showed there were still a few flat-flame burners existing in the street lamps as mementoes of the past. Twelve months ago, there were only eight; and where that figure then appeared, we now see "*Nil*, flat flame," which reminds of the celebrated chapter on "Snakes in "Iceland." While mentioning public lighting, it is a point worth notice that the Company are doing well with their high-pressure gas-lamps for shop-front lighting; they having already connected 1870 lamps of this type.

There is not a weak spot in all the accounts other than that of gas consumption; and that one is uncontrollable. The report mentions that the make of gas per ton of coal exhibits a further improvement on the figures hitherto reached; having risen to an average of 12,392 feet per ton. This is a flight that stands out in bold contrast with the improvements effected in the two immediately preceding half years, when the average makes were respectively 12,024 and 12,044 cubic feet. Upon the make, engineers and retort-house workers are all alike to be congratulated. The total volume of production was 6,532,323,000 cubic feet, or a retrogression of 149,173,000 cubic feet. The approximate relative effects of the reduction of make and the increased make per ton are matters that are worth remarking. For the six months, 527,150 tons of coal were carbonized, or a decrease of 28,530 tons. If we calculate out the reduction in total make at 12,392 cubic feet per ton (the half-year's production), it would represent 12,038 tons of coal; so that the increased yield per ton may take credit for at least a saving of 16,492 tons. Something more than this saving is represented in the lower expenditure on coal; for the outlay in this connection was £306,287, which is £33,916 less than in the December half of 1910. Seeing that residuals gave an increase in receipts of £18,282, and there was a large saving on coal, the reduced revenue from gas of £16,746 is completely swamped.

Generally examining the figures in the revenue account, under the heading of manufacture, we find a decrease of £26,076; the total expenditure having been £519,972. The lessened outlay on coal has already been referred to (£33,916); but more has been spent on purification, £6352, making the amount £21,582. We have on one or two occasions referred to the experiment that has been in progress at one of the Company's stations for purifying their gas by less objectionable means than using lime. The report tells us that a plant on a large scale has been working; and the results are so good that it is proposed to extend the experiment still further during the current year. It will be of technical interest to have information on this subject. The effect of the higher payments in wages to the men in the manufacturing department is seen in the £3256 increase found in the wages item of £48,030. The Company's total wages bill in the half year amounted to £291,701. In the distribution department, the expenditure has been £173,538, or £4432 more. The item in which there is the largest variation is repairs and renewal of mains and services, which increased, by £10,902, to £42,926. The other items decreased or increased in a less abrupt manner; the greatest diminution being represented in the drop of £5611 in the item (£45,426) of repair and renewal of gas-fittings. The charge for public lamps (£2854) is only about half what it was twelve months ago. Rents, rates, and taxes are £9031 more; the item standing at £54,944. Without touching the other items, it may be said that the total expenditure, £815,948, exhibits a decrease of £14,429. In the matter of revenue, equilibrium is almost established with the second half of last year—the £1,030,306 received being only £68 less. As has been pointed out, gas, in returning £643,481, yielded less by £16,746. Meter and stove rentals and gas-fittings, in contributing £110,325 to revenue, produced less by £1581. More than this difference is on gas-fittings; seeing that meter-rentals gave £861 more, and stove and fire rentals £1461 more. Residuals were again very strong. The revenue in this department was £274,911, or some £18,280

more; the increased contribution of coke being £7182, of tar and tar products £5572, and of sulphate of ammonia £6442, while breeze gave £914 less. The final result is that the balance on the working is £214,358, or £14,362 more, which enables the surplus carried forward to be increased by £6395, and this after paying debenture interest and a dividend at the rate of £5 9s. 4d. per cent. per annum. This is good. With atmospheric conditions favourable for gas consumption, the half year would have been for the Company still more notable. It is notable in that the factors that have weighed against the temporarily bad one are solid and heavy.

Amalgamation and Economic Developments.

THE preliminaries connected with the project for the amalgamation of the South Suburban, the Bromley and Crays, and the West Kent Gas Companies are passing through smooth waters; and there seems every reason to suppose that the scheme will be consummated without imposing or seriously embarrassing difficulties coming in its path. The principle of amalgamation appears to have been so very generally accepted as correct, that only on details is it likely there will be any possible discussion. The scheme has been cordially approved by the proprietors of the three Companies. If there are any misgivings elsewhere at all, it will only be necessary to read and piece together the details of the various speeches delivered by the Chairman of the South Suburban Company (Mr. Charles Hunt), at the proprietors' meeting, as reported in other columns, to see fully the advantages that will accrue to the entire area. It is a project through which run the elements of progress for districts and all concerned in them; and it is only right to say that to Mr. Hunt and the Engineer of the South Suburban Gas Company (Mr. S. Y. Shoubridge) the members of the Board give the largest measure of credit for having brought the scheme to the present stage at which there is a common recognition of its politic and practical character.

We are publishing an outline map of the districts that it is proposed to amalgamate into one large gas-supply area; and this shows first its extensive character, and secondly its relation to neighbouring concerns. As to its extensiveness, we are under the impression that it will comprise an area that will, if the scheme succeeds (as there is no shadow of doubt it will do), rank, in respect of magnitude, among the first three or four gas-supply territories in the country. The map points out how the South Suburban Gas Company, the most economically worked of the three concerns, is, with its fairly well-covered area, hemmed in at present upon all sides; while the less (through inherent circumstances and disabilities) economically worked Companies on the southern borders have what is at present a disadvantage to them, but will be an advantage in future to the larger Company for development under the more propitious circumstances that the amalgamation will bring about—a considerable amount of open area, or breathing space. The migratory tendencies of the times, from residence in large centres to residence in the more remote "suburbs," will, aided by the improved travelling facilities, render valuable this existing open area to a Gas Company in a position to carry on business on economical lines. Whether the amalgamated Company will be able to work more economically than the three constituents are doing in separate state has been a matter of close calculation on the part of Mr. Hunt, his colleagues on the Board, and Mr. Shoubridge; and their absolute confidence is best reflected in the immediate and prospective benefits offered to the gas consumers, the proprietors, and the gas workers in the Bromley and the West Kent areas and companies. These benefits (which are detailed in Mr. Hunt's speeches) must contribute to the prosperity and the development of the areas. So far as the South Suburban Company is concerned, the benefits are not so immediate, but they are not illusive. They are prospective and very material. There is no question on this point, so far as it is humanly possible to gauge and forecast by present signs and the exercise of expert knowledge. Even if it had been necessary, and it will not be, for the proprietors to temporarily forego part of their dividends to bring about the amalgamation, its potentialities would have fully justified the Board in recommending it for adoption.

Area undeveloped for business is not the only consideration. It has been pointed out before in these columns, and Mr. Hunt and the map we publish point it out still more emphatically and clearly, that the amalgamation opens up an economy of which the West Kent Company in their restricted area could not make full use, while it was denied to the Bromley Company, and still more so to the South Suburban Company. The last-named Company initiated negotiations for amalgamation with the Bromley Company. These succeeded. The South Suburban Company were then nearer (subject to the endorsement of proprietors and Parliament) than before to the Thames. Negotiations were opened up, and successfully concluded, with the West Kent Company. Subject again to the endorsement of proprietors and Parliament, the whole united gas-supply area of the South Suburban and Bromley Companies, were brought into direct communication with the banks of the Thames, and nearer to the mouth of the Thames than the large London Companies. The lines of future developments are plain. Pithead gas production and distribution, to save coal carriage, has long been the dream of visionaries and certain enthusiasts; but there are practical limits to that sort of thing. Large works concentration at the point of low cost reception by water of raw material, dealing mainly with the raw material where it is landed, and distributing the gas therefrom, has been found more economical than conveying coal into the depths of a district. We have Beckton and East Greenwich as examples. The development of Beckton in the quest for still greater economy is one of the causes of such annexations as the territories of the West Ham, Barking, and Chigwell, Loughton, and Woodford Companies. No further works developments will take place place at West Ham; what were the Barking and Chigwell Company's works have been closed down. Beckton, with its coal delivered by water into the retort-houses, now supplies the smaller areas, and is taking up the increase in the West Ham area, and will ultimately supply it completely. The South Metropolitan Company are also further developing the manufacturing power of East Greenwich. It is too soon to say precisely what will happen in the case of the new South Suburban Gas Company. But Mr. Hunt gave sufficient indication of works developments on the banks of the Thames at Erith for anyone to contemplate, with a fair amount of confidence, the lines of policy in this regard in the future. The underground conveyance of gas, within reasonable distances, is a more economical matter than the overground conveyance of coal. Here we have one of the capital arguments for this scheme.

Profit Appropriation, Steam-Rollers, & Other Topics.

WITH the review in other columns of the Provisional Orders that have been promoted, our readers have had placed before them a complete indication of the lines of the legislation that will engage attention in the session of Parliament that is now close upon us. In the comments last week upon the legislation affecting local authorities, reference was made to matters where (the opinion is growing in legislative circles) some restriction might, with wholesome and equitable effect, be put upon municipal trading—especially in regard to the burden incontinently thrown upon gas consumers of being made to provide money for purposes that should be paid for by the *pro ratâ* contribution of the ratepayers. Interest is drawn to the subject again by two of the Provisional Orders that are before the Local Government Board, and which suggest that it would be far better not to sanction by law the first steps in this liberty. The past has demonstrated the mistake of doing so, as well as the injustice. It is possible that it may be said: "You plead for equity on the part of "the consumers, while you propose instituting inequality as "between one trading local authority and another." We can justify the equity that it is sought to establish as between the gas-consuming ratepayers and the non-gas consuming ratepayers; and the inequality as between one local authority and another is abundantly justified in the primal stages of establishing right for wrong, until the reform covers the whole. A start in reform in this particular has already been made; and what is desired is that it be continued.

There is a small amount of restriction suggested in the Bala District Council Order, and that of the Hipperholme District Council. In the first case, no part of the gas profits are to be carried to the credit of the district fund while the price of gas exceeds 3s. per 1000 cubic feet, and in the second case while it exceeds 4s. The defect of this proposal is, that there will be as great an inducement to get money for the district fund as to reduce the price of gas immediately the charge falls in the one case (say) to 2s. 11d., and in the other to 3s. 11d. This freedom is wrong, and ought not to be allowed. The concerns should be run for the best

service of those who patronize them, with the safeguards suggested last week; and should any deficiency in revenue at any time arise, it should be loaned from the district fund, and be repaid from the first accumulated profits. In these two Orders, there is the clause which, in one respect, protects gas consumers by making the gas used for public lighting a matter of business between the undertaking and the ratepayers, and not an absolute charge on the gas concern as it is in some instances. In the two Orders named, it is to be enacted that the price of gas for public purposes is not to be less than that charged to private consumers by more than 10 per cent. This is a very reasonable arrangement. But making the gas consumers pay for the gas used in the lighting of the streets or public buildings, which lighting is for the benefit of the community as a whole, is just as corrupt in principle and practice as making them pay for other public services the cost of which should be borne generally by the whole of the ratepayers.

We are reminded of another important matter by one of the Orders before us. Those who followed the course of legislative affairs last session know how certain of the county councils of the country pressed gas companies hard to get them to forego some of their common-law rights, and to come under special statutory terms that would have relieved the councils from most of their present obligations in regard to gas-pipes in the roads under their jurisdiction, while placing greater financial burden on the owners of the pipes, and reducing the protection to which they are now entitled. Readers will remember how, in the Uxbridge case, the Hertfordshire County Council pursued the Gas Company before the Board of Trade, and then through both Houses of Parliament, to obtain statutory stipulation exempting them from liability for any damage done through the use of a 15-ton roller. Parliament would not consent to any such monstrous proposal. That was only one case among others. But in connection with it, Mr. H. E. Jones, the Chairman of the Gas Companies' Protection Association, begged gas companies to stand firm, and not forfeit any of their existing legal rights in this matter, or to allow the creation of a new precedent and principle. We are sorry to see the Welwyn, Knebworth, and District Gas Company, have given way to the Hertfordshire County Council, and consented to their exemption from liability for damage occasioned by a steam-roller or any other engine not exceeding 15 tons in weight. What such little companies will find, if they give way in this manner to this or any other county council, is that they are under more onerous terms than the larger companies who resist such imposition. Of what profit were all the successful fights by other companies over this very question last session to the Welwyn, Knebworth, and District Gas Company, if they so readily resign a point of protection to which Parliament—both House of Lords and House of Commons—deliberately said last session the Hertfordshire County Council were not entitled. We hope there will be no other companies who will relinquish their existing legal rights in this manner. It is altogether too ridiculous when Parliament has delivered its judgment against the claim of the councils.

Among general matters, it is seen that the Swansea Gas Company, after their big fight of last session, are asking, through a Provisional Order, for manufacturing powers over a new site. It is also observed that, notwithstanding the South Suburban amalgamation scheme, the West Kent Gas Company are seeking for a grant of manufacturing powers over additional land at Erith. We take it this is a matter of protection in the event of the South Suburban Bill failing. But whatever happens, the land will be valuable. In the Arbroath Bill, is found a very useful clause for municipal gas undertakings. It is short but pregnant: "The Corporation shall have full power to take all such "steps as they may consider necessary or expedient to pro-"mote the use and sale of gas manufactured by them, and "the residual products thereof." There are in other Orders a few miscellaneous variations from precedent or standard forms. In the Cleethorpes Order, there is a stand-by clause relating to power or other purposes, "not being domestic "purposes." The exclusion of "domestic purposes" where the stand-by clause refers to electricity supply might in some districts represent a substantial amount of idle expenditure and unremunerative labour. The Harrington District Council are asking for a stand-by clause in respect of electricity, but not of gas. Small modifications of the model prepayment meter clause are also noticed here and there in the Orders.

Mr. Corbet Woodall.

From his recent indisposition, we regret to say Mr. Corbet Woodall has not yet completely recovered. But it was a satisfaction to the proprietors of the Tottenham and Edmonton Gas Company last Saturday to see him in the chair at the ordinary half-yearly meeting, though not feeling sufficiently well to personally deliver his address. However, the proprietors were not precluded from hearing their Chairman's views on the excellent position and prospects of the Company, as he had taken the precaution of preparing an address; and this was read by the Secretary. The meeting of the Gaslight and Coke Company is fixed for next Friday; and it is sincerely hoped that Mr. Woodall will have recovered his normal condition by then, as it would be a grievous disappointment to the proprietary to miss the Governor, even for one occasion, from his customary place.

Edinburgh Policy.

An interim report has been prepared by a Sub-Committee of the Edinburgh and Leith Gas Commissioners on the subject of adopting a more forward commercial policy in connection with the gas undertaking. The recommendations of the Sub-Committee were given at the close of reports by Mr. W. R. Herring, Mr. A. Masterton, the Acting Engineer, and Mr. A. Canning Williams, the Treasurer. The recommendations were referred back to the Committee for further consideration. We may take an early opportunity of dealing further with the general question.

The Ilkeston Gasholder Disaster.

Further examination into the cause of the Ilkeston gasholder disaster is made in special articles in our columns to-day. Mr. W. Gadd, to whose inventive ability the gas industry is indebted for the spiral system of guiding gasholders, is one contributor; and another is Mr. Norton H. Humphrys. Their criticism and examination of the available evidence is suggestive and instructive; but they both admit the obscurity of a definitely acceptable reason to account for the origin of the disaster. Supplementing these articles, there is published a plan of the works; but more important are drawings (prepared by Mr. J. Ferguson Bell) of the spiral holder and tank, with data as to the members and plates used in their construction. All these drawings and particulars will be examined with peculiar interest by engineers and designers, although we fear that they only intensify the mystery surrounding the primary cause of the accident.

Another Co-Partnership Scheme.

It is a pleasure to be able to publish in our news columns to-day some particulars of a co-partnership scheme which has been adopted by the Liverpool United Gaslight Company, and the operation of which is to date back to July 1 of last year. It will be seen that the bonus is to be 15s. per cent. on wages paid for each penny at which gas is sold below 2s. 8d. per 1000 cubic feet; and the result of fixing so high a "starting point" or "standard" from which to calculate to workers' proportion of the profits, is that an immediate bonus at the rate of 5¼ per cent. will accrue on the wages of the employees included in the scheme—the present charge for gas being 2s. 1d. per 1000 cubic feet. One-half of the bonus will be invested in the Company's ordinary stock; and the remaining half will be left in their hands at the credit of the employees to accumulate at interest at the rate of 3⅓ per cent. per annum, or it may be withdrawn under special circumstances by giving a week's notice or be invested in the Company's stock. These co-partnership benefits will be considered as being in addition to questions of rates of pay, pensions, holiday pay, sick pay, or benefits accruing from statutory obligations—such as the Workmen's Compensation Act and legislation regarding unemployment, sickness, and invalidity. It is pointed out that the share and loan capital of the Company is £1,986,973; and that in this respect, therefore, they come fourth on the list of co-partnership gas undertakings—the Gaslight and Coke, the South Metropolitan, and the Commercial Companies being the first three. The Liverpool Gas Company have, we also learn, already administered a Workmen's Saving Fund, in which the employees have £16,000 to their credit; and twenty years ago a scheme for pensions on a non-contributory basis was adopted. The workers—of whom one is not surprised to hear that 90 per cent. have signed the co-partnership agreement—are to be congratulated upon this further practical proof on the part of those who employ them of the desire to look after their welfare in every possible way.

Salford's Inventiveness.

The inventive capacity of Salford is of a really extraordinary order. New ideas pour from the Committees of the Council with the view of saving a high margin of gas profit for the benefit of the rates, to the detriment of gas consumers. There is a proposal now to swallow up by annexation two of the recalcitrant areas, the Councils of which have cornered the Corporation over this gas-profit appropriation business by promoting a Bill that the Corporation have no power to withdraw. Eccles, Swinton, and Pendlebury cannot at present see what they are to gain by being tacked on to Salford; and we are glad to know they have quite made up their minds that they are pursuing the right course in proceeding with their Bill. Meanwhile, the Local Government Board appear to be still siding with the Salford Corporation, and are pushing things forward for a local inquiry into their Provisional Order for the 22nd inst. It seems to us that the Local Government Board—in possibly compelling the outer districts to oppose at the Local Government Board inquiry, and then continuing their appeal to Parliament, while there is a ready-made Bill in Parliament containing the basis of an agreement in terms already approved by a Parliamentary Committee—are causing just as great an expense as dealing with the matter direct in Parliament. It will make a good tale to put before a Select Committee of how the Salford Corporation and the Local Government Board tried to force a departure from a basis of agreement that has parliamentary authorization.

Interesting Commercial Notes.

Every one of our readers should study Mr. Corbet Woodall's address to the proprietors of the Tottenham Gas Company last Saturday; for it is rarely one gets an address packed so full of topics touching on the purely commercial side of the gas industry. Of course, the Tottenham Company have an exceptional district; the composition of the population being just that in which the use of gas for all purposes appeals on the score of economy. The price of gas is now down to 2s. 2d. per 1000 cubic feet; and the consumption during the past hot and mild, but never really cold, half year has put on 4·3 per cent. increase. Dividends for the proprietors are higher; the capital charge is a little under 6d. per 1000 cubic feet, which, with one exception, is the lowest among suburban companies. The bonus the employee co-partners enjoy is larger than ever. These are highly satisfactory features to the Directors, proprietors, officers, and men; and especially to the Engineer and Manager (Mr. A. E. Broadberry). We will not dip deeply into the address here, except to invite particular attention to two unusually interesting points. Automatic lighters and extinguishers in connection with the public lamps have now been introduced into the greater portion of the Company's district; and this has produced a diminution in the cost of the maintenance and upkeep of the street-lamps that is reflected in a material reduction of charge to the local authorities. The second point is that house-to-house inspection has been made in 170 streets; and it is found that 97 per cent. of the houses contain meters, with 5 per cent. of the houses unoccupied. Only 3 per cent. have no gas-meters. In the 10,970 houses investigated (all private ones), there were only 27 consumers of electricity; and of these 25 use gas for cooking and heating. Comment is unnecessary.

The Civils and the Exclusives.

The promoters of the new Association of Consulting Engineers have received about as nasty a knock from the Institution of Civil Engineers as they possibly could have, by the Council of the latter having made known to all concerned the contents of a letter that was addressed by the Secretary (Dr. J. H. T. Tudsbery) to the movers in the formation of the Association as far back as October last. The letter is indicative of a greater broadmindedness, greater commonsense, and greater consideration of public interests than the promoters of the Association have shown in this matter. Despite the letter from the Institution, the promoters have persisted in their endeavours to set up an Association of Exclusives, though the very proposal suggests that the members feel the need of some support external to themselves. They are really making themselves ridiculous in the eyes of the profession. The Council of the Institution recognize the absurdity of excluding from membership of the Association men occupying official positions who also act as consultants; and they agree that any step taken to debar from advisory and consulting work, anyone whose experience may specially qualify him to give advice, would be an injustice to him, and *a serious loss to the public interest*. That is the point; while the loss of some consultants, with little official experience, would not be a very great one to the public. Supposing, it had been regarded as advisable some years since that persons holding official positions in the gas industry were not suitable for consultative work, there are not a few eminent gas engineers who could be named whose best labours in this direction would have been lost, to the detriment of the public interests. Perhaps those who require engineering consultants will prefer to select where they please from those consultants who do not need the support of an Association of the kind, and from those with special capacity and experience who are in official positions. Those who have to pay have the right of exercising their discretion and power of selection; and they will, by a little education, learn that an Association of Exclusives does not contain all the best pebbles on the beach.

A Council and their Contracts.

A resolution which may be noted has, after a good deal of discussion, been passed by the Walthamstow Urban District Council; and presumably the effect of it will be that the following announcement will appear on all contract and tender forms for the supply of goods to the Council: "That no tender for the supply of goods or materials be considered of any person or firm known to have a representative or paid servant a member of the Council; and if, after a contract has been entered into, it is found that a member of the Council was a representative or paid servant of the contracting firm at the time the said contract was made, the contract may at the discretion of the Council, be declared null and void." It is true that an amendment was moved to the effect that the ordinary provisions of the law were sufficient for the object desired; but this was not carried—the voting for and against being equal. This, too, in spite of the fact that the Clerk had pointed out that, under the Local Government Act, any member who gave a vote on a contract in which he was personally interested was liable to a fine of £20. Even as drafted, the resolution was not strong enough for all the councillors, as one proposed that it should apply also to relatives of contractors, so as to make it "as drastic as possible." He was, however, unsuccessful—perhaps because of the difficulty of answering a query as to how he was going to define the word "relative." Another member said he would like to stop councillors supplying contractors with materials; but he confessed that he did not know how it could be done—and no one in the Council appeared able (or if able, willing) to tell him. One of the speakers against the original proposal remarked that if the resolution were passed by every authority it would mean that one-half of the Progressive members on public bodies would be disfranchised; and that there were thousands of men in the town in the employ of City firms who would be debarred from entering public service. Another thought it might stop some working men having a seat on the Council; and a third doubted the legality of the action they were asked to take. Whether the Finance Committee had considered all these points before bringing the resolution forward, we do not know; but, if not, they may give them their attention as occasion arises.

Coal Position—Neat Carburetted Water Gas.

As the half-yearly reports and accounts come in from gas companies working in different parts of the country, it is seen, as was expected, that the conditions in the coal-fields have caused Directors considerable anxiety; but most of the concerns—the London ones among others—have fortified themselves with large stocks. There are cases in which the contractors have not been able to keep pace with their contract quantities, through the disturbance and pressure brought about by the threatened national coal strike; and it has been necessary to supplement stocks from the open market. Coal bills will go up somewhat in consequence. The Gaslight and Coke and the South Metropolitan Companies are well armed; and they are using the opportunity of higher household coal prices and the cold weather to largely advertise gas-fires, which are becoming more popular year by year. The weather of the past few days emphasizes the poor heating value of electric radiators, and assists in inducing eviction. There are striking references to the position in the address of Mr. Corbet Woodall at the meeting of the Tottenham and Edmonton Gas

Company. The Directors have bought nearly 60 per cent. of the coal for 1912-13 at a small increase over the amount of the current contracts; and the Company's supply of oil for the year 1913 is also secure. These are satisfactory announcements. The next striking point is the statement of the Chairman as to an experiment in the supply of carburetted water gas unmixed with coal gas. He said: "In case of necessity, the Company could give a supply of oil gas, without needing the use of coal, for many weeks. This would not be a unique experience on our part, inasmuch as we, some years ago, supplied oil gas only to the district for about a fortnight, with, so far as I am aware, entire satisfaction to our consumers." Meantime, the outlook in the coal trade in relation to the dispute over the question of a minimum wage, is brightening. The miners are not giving way over the question of principle; but they have relaxed their demands as to the height of the minimum, and the various districts have formulated their schemes. The nature of these has been published in the daily papers; and therefore it is unnecessary to refer to the figures here. Whether the revision will enable the owners to recede from the firm attitude they have hitherto adopted is not yet known; but they will realize that what is represented by the moderation of claim will only be, according to precedent, the thin end of the wedge. The men's representatives are meeting again on Feb. 13. The days between now and then will disclose the owners' views, and probably the result of a joint conference.

Projected Gas Exhibition in Amsterdam.

We learn from a circular issued by Heer J. Van Rossum du Chattel, the Manager of the municipal gas-works at Amsterdam, that a project is on foot for holding an international gas exhibition in the city. There has not been any exhibition of the kind in the Netherlands for some years past; and meanwhile great technical progress has been made. In spite, however, of the efforts of manufacturers and dealers to bring this truth home to the general public, it frequently appears that a great number of the applications of gas and of the improvements introduced are still insufficiently known, and do not, therefore, meet the appreciation to which they are entitled. The exhibition will therefore aim at giving an idea of the various appliances used for illumination, as well as for domestic and industrial purposes. It will be held in the "Paleis voor Volksvlijt" [Industrial Palace], which, owing to its favourable position in the centre of the town and to its convenient size, may be considered very suitable. It will be opened on the 14th of September, and closed on the 6th of October; the right being reserved of keeping it on for an extra week. It has been suggested to have in one of the rooms of the building lectures on various subjects connected with the consumption of gas; and it is hoped that they may lead to a more general interest in gas and its many applications. Heer Van Rossum du Chattel directs the attention of manufacturers and dealers to the opportunity afforded them of bringing their products and articles under public notice; and he requests them to let him know, at their earliest convenience, whether or not they will be willing to take part in the exhibition. A small charge for space will be made; but the gas used, together with all the pipes and fittings to the stands, will be supplied gratis. A number of diplomas will be at the disposal of the Jury. Heer Van Rossum du Chattel's address is Municipal Gas-Works, 29A, Amstel, Amsterdam.

"Transactions" of the German Gas and Water Association.—We have received from Herr Oldenbourg, of Munich, the volume of "Transactions" of the German Association of Gas and Water Engineers for the past year. It contains the report of the proceedings at the fifty-second annual meeting, held in Dresden last June, under the presidency of Herr Prenger, the Manager of the gas, water, and electricity works of the Cologne Corporation, together with reports of the various Commissions. The technical matter has already been noticed in the "JOURNAL." In the volume it is illustrated by 15 tables and 131 diagrams, &c. There are about 700 pages of text, which is followed by lists of officers, members of the Commissions, and of the Association, and the names of the towns in which they are engaged.

Mr. Miller on Gasholder Guide-Framing.—By an accidental slip of the pen, to which a correspondent has kindly called attention, we attributed to Mr. E. F. Miller, the author of the article on "The Guide-Framing of a Gasholder" which appeared last week, a preference for "a steel frame with stiff diagonals and no horizontals." We should have said that he thought this kind of framing presents a pleasing appearance and is a stiff and rigid design; but that the views given of his own design show a frame with light diagonals and stiff horizontals. Our correspondent remarks that though there may be special reasons for having stiff diagonals and no horizontals in certain cases—and he himself favoured it in one instance—it by no means follows that this is the best design to adopt universally for all sizes of holders. In fact, small holders may, in his opinion, be more economically constructed.

ELECTRICITY SUPPLY MEMORANDA.

Light and Costs Underestimates—Interest in Gas-Oven Methods—The "Telephone" System of Charging—Questionable Conditions—Mixed Tariffs and Mixed Views—Economy of Electricity—The Abuse of the Gas Cooker.

ELECTRICAL engineers have a *penchant* for underestimating things. Much has been heard lately about the underestimate by £10,000 of the initial cost of converting the public lamps of Hampstead from gas to electricity. But there was another underestimate, and that was in regard to the amount of light that the public required, and expected to get from the great expenditure. The emphatic and sarcastic way in which the ratepayers of the borough have criticized the light shed by the metallic filament lamps in the streets has caused the powers that be to exert themselves, and to at once put in hand a scheme for improvement. This can only mean lamps of higher candle power; and such lamps involve greater expenditure not only in installation and renewals, but in current, and this, perpetually, means additional outlay. Thus it comes about that the whole of the estimates—initial and running expenses, and light required—were erroneously based. It is the bad old electrical story. Trimming-down in the first place to give a scheme a respectable financial appearance, and then afterwards, when the ratepayers find they are not getting value for money, the building-up process has to begin, to give greater satisfaction, with the result that the financial part of the proposition assumes altogether a new aspect. All these Hampstead underestimates were foreshadowed by the Gaslight and Coke Company in a communication to the Council when the conversion was originally under consideration.

Take Marylebone again. There, as elsewhere, 35-watt lamps were considered sufficient, installed we believe in pairs, each pair giving a light of (say) 50-candle power. Some of these lamps had hardly been fitted, when in certain positions they were hurriedly exchanged for lamps of higher wattage. Discontent continues. The Lighting Committee of the Borough Council have recently had before them a letter calling attention to the badly lighted condition of Wigmore Street; and the letter stated that, if the Council were not considering the improvement of the lighting of this thoroughfare, a deputation of large ratepayers would like to have an interview with the Lighting Committee—presumably to let them have a little bit of their minds, and to know the reason why they continued to deal out such indifferent lighting to them. The Electricity Supply Committee appear to have been flustered by the communication; and before it formally came before the Council, they had decided to put 88-watt lamps in Wigmore Street, in place of the 35-watt ones, and that without additional charge. But the 88-watt lamps will cost more, and will absorb more current than the 35-watt ones. All this is a caustic comment upon the light and cost estimates of electrical engineers in connection with public lighting; and upon their own photometrical tests that invariably give to a pair of their 35-watt lamps a higher candle power than can be obtained from an inverted street lamp burner consuming (say) 3 cubic feet of gas per hour. The tests, unfortunately for them, are not borne out by independent testers; and what is even of greater importance, by the verdict of public opinion. After all, the main thing is the satisfaction of the public, and not of the gentlemen who deal in foot-candles.

It is very funny. The electrical people have given themselves an unnecessary and painful shock. It has come about through their campaign to get a footing in domestic cookery, and their random claims as to the electric oven being endowed by providence with virtues of unprecedented quality. The electrical shock occurred in the reply by Mr. Seabrook to the discussion on his paper on "Residence Tariffs"—a communication to which we have already given a little attention in the "Memoranda." Mr. Seabrook stated that electricians all knew that cooking by electricity was much better than cooking by gas, and also about the saving in the weight of meat; but he was interested to see that the gas people were getting an oven to do *exactly the same thing*, and, *in fact, were following very closely on the heels of their electrical competitors*. The electrical papers have pounced upon this, and have come to the conclusion that a new gas-oven is being designed. One contemporary says the manufacturers of gas-ovens have been so impressed by the results obtained in electric-ovens that they are introducing a pattern in which the meat would be placed in an inner closed vessel. Another one says that the gas industry is introducing a totally enclosed oven for baking and roasting. And yet another says that Mr. Seabrook mentioned a new gas scheme for "imitating" the effects of the electric-oven. All wrong! We are sorry to disappoint our contemporaries. The manufacturers of gas-ovens have had nothing to do with what Mr. Seabrook referred to. A new pattern of gas-oven, so far as we know, is not being designed. What has given rise to these misconceptions is the design some time since of an enclosed baking-tin suitable for use in gas-ovens already fixed and to be fixed. The method of cooking meat in this way is not new; but it has not been so widely known as it ought to have been. "Meteor" in the "Electrical Times" says that one defect of this enclosed baking-tin method is that more gas will have to be used. Now, who on earth told "Meteor" this? It is a pity he should give way to such a bad habit as jumping to conclusions. He is hugely mistaken. The contrary is the case; and the proof is found in practical experience over several weeks. What is more, there is less trouble with an enclosed tin of the kind than

with an open tin used for cooking meat in either a gas or an electric oven. We can quite understand that, with electric cooking, owing to the lower range of heating ability of electricity compared with gas, and with temperatures at fixed stages with the heating elements employed, that more current would be required with an enclosed baking-tin than with an open one. One of the electrical papers suggests that the enclosed baking-tin method of cooking in a gas-oven should be put in competition with an electric-oven by competent chefs. The paper will be interested in the letter in our columns last week from the designer of the simple enclosed baking-tin for gas-ovens, whose working career has been spent in cooking and baking. He has voluntarily issued a challenge to test the real working capacity of an electric-oven in comparison with a gas-oven, and so ascertain the relative working and cost efficiency—notwithstanding that gas is charged at lighting rates, and the electricity at only 20 or 25 per cent. of the lighting price.

Discussion upon Mr. Seabrook's paper on "Residence Tariffs," has concluded; and the author has replied to his critics. The feature of the discussion was the terrible tangle of opinion on the part of the official advisers of electrical undertakings as to what are the right and what are the wrong principles and methods in the making of tariffs. One after another members got up, and pitched into the ears of those present reasons why this or that method of charging is unsound; so that if the whole of these opinions were accepted, we should still be looking about for a new electrical tariff, or falling back on the well-tried, old-fashioned method of flat-rates, with a discount to considerable patrons. Mr. Seabrook did not do anything, in his reply, to relieve the situation of discord and muddled view. He has built his faith largely on the "telephone" system of charging, while finding that it does not meet the conditions and views of all his customers. Wherefore, he keeps a dozen or more different methods of charging at his service, and tells his consumers that they can pick and choose from them, and so please themselves. The electrical industry, outside the old flat-rate and discount system, has not evolved one that has universal application—one that will fit all circumstances; and it is clear that such a system never will be found. Mr. Seabrook thought he had discovered the right thing when the "telephone" system came along, which is based upon a calculated—calculated on lighting points—lump prepayment, and a low price per unit used. The user of electricity under this system, it appears, has to bind himself not to employ any other system of lighting; and the whole of the standing charges are piled upon the lighting. The main idea is that the consumer under the telephone system can have energy for any other purpose at the low price charged per unit apart from the lump-sum payment, and thus avoid dual wiring and meters. As a matter of fact, it would pay electric lighting stations better, if their consumers on the telephone system did not use current for other purposes. If one works backwards, it must be found that the fewer the low-priced units used, the greater the net profit derived from the lump sum. However, we do not know many domestic electric lighting installations that would stand the introduction of connections for other than very simple and unformidable purposes without overloading, and so additional wiring in those cases would be necessary. But as we have before pointed out, in addition to the weakness of the system that the whole of the capital charges are callously thrown on to the lighting units, it has the further defect that only those who can afford to pay for duplicate wiring can afford to meet the demand for the prepayment of a lump sum.

There is some question as to whether Mr. Seabrook and his Committee are acting altogether legally in what they are doing in connection with the "telephone" system of charging. It is at all events diametrically opposed to the spirit of legislation affecting gas and electricity to make it a condition that a man shall not patronize the competitor. Gas and electricity suppliers are compelled to supply on demand if the demand is made within the statutory conditions. This indicates a liberty on the part of members of the community of which the Marylebone Electricity Supply Committee rob them. Parliament, too, has been particular to make it clear in recent years that financial considerations in the transactions with consumers must be alike under similar circumstances. Mr. Seabrook pleads expediency. Expediency does not, however, always represent justification, nor what is lawful. It shows a decided weakness of the system, that it is regarded as necessary that such a stipulation as to liberty should have to be made. Of course, we can well see that, calculating the lump sum to be paid on the points of lighting, the dimensions of the lump would be lessened if a second system of lighting was adopted; and those with both systems who use electricity for purposes other than lighting would get their electricity at a lower average price per unit than those whose whole houses were electrically lighted. The same argument applies to the large house and the small house—both fully equipped for electric lighting. Assuming that both had occasion to only use the same amount of energy for other purposes, the former (paying the larger lump sum) might pay a greater average price per unit for current used than the latter, though contributing more revenue to the undertaking. The smaller householder, too, may prefer fewer and lower lighting units, in order to narrow-down the lump sum. The advocate of expediency smiles at the nakedness of the several defects of his pet system; but he defends it with superb Seabrookian logic.

Among the speakers in the discussion was Mr. J. S. Highfield, of the Metropolitan Electric Supply Company; and his speech was worth many of the others put together. We may mention a few of his and the other speakers' points. Mr. Highfield thought it was unfortunate that, owing to so much electrical energy being sold under municipal control, the importance of a sufficient return on the capital was to some extent lost sight of, since money for the municipal business was found not on the security of the business, but on the security of the rates. There was no doubt that the rate of profit earned on electrical undertakings should be improved. We wish that Mr. Highfield would supply us with the details of a matter that has particular interest, in order that it may be fully examined. It is this: He stated that (taking the report in the "Electrician")—

> He had taken about six of the largest gas, electricity, and water undertakings in the country, reduced the tariff, and altered the figures so as to give a constant rate of 8 per cent. on the total capital employed, with the following results: Assuming that £100 represented the capital employed in each of the three cases, the gross revenue for gas undertakings was £32, for electricity undertakings £13 10s., and for water undertakings £10, the costs were for gas £24, electricity £5 5s., and water £2, and the ratio of costs to revenue 75, 40, and 21 per cent. respectively. That clearly showed that it was a proper thing to charge for gas in proportion to the amount of gas taken—*i.e.*, by meter at so much per 1000 cubic feet—because in that case the working cost was the most important part of the total cost. In the case of water, the working charge was a very small proportion; and therefore it was proper to charge so much per cent. on the rateable value. Electricity was intermediate between the two, and therefore the figures provided a justification for the "telephone" system of charging.

On other points, he finds the electric slot meter system is not wholly satisfactory. He has also between 100 and 200 consumers paying a flat-rate per lamp; and they use the energy so wastefully that the charge comes down to 1d. per unit. Even then the consumers are not satisfied. He also considers that a very low charge for energy for electric cooking is not at present warranted. As yet there is very little experience to show what the cooking load will be. Upon this subject, Mr. L. E. Buckell, of Newcastle-on-Tyne, mentioned records from a house where neither coal nor gas was used; electricity being employed for heating, cooking, and lighting. These showed that in almost every case the lighting, heating, and cooking peaks coincided with the peak on the whole supply system. From this, he thought it important that they should know exactly for what they were bidding before they offered too much for it. As to the supply of small houses, these he said could only be obtained on a charge per lamp per week basis; but, so far, the difficulty had been to find a rate which was at the same time remunerative and sufficiently attractive to get the load. Touching this question, Mr. A. J. Cridge instanced the case of a Sussex undertaking supplying superior working-class dwellings. At first, they worked on the contract system, metering the units *en bloc*. The suppliers of the electricity were dissatisfied; and so installed prepayment meters, with the result that the revenue went up, and the units used went down to one-fifth of what they were before. These are a few of the many interesting points in the discussion. They indicate that, with all the time and energy spent on the construction and application of tariffs, electricity undertakings are not in this respect yet out of the wood.

There is an amusing letter by our old and optimistic friend Percy Good in the "Electrical Review." He says that at present the modern household is not run entirely by electricity, but it will be very soon; and he expects that electricity will easily beat gas in the matter of the time it took from its introduction to obtain almost universal use. As the gas industry is bigger to-day than it ever was, and as electricity has already had a run of about thirty years, some smart work has to be done in the immediate future to justify Percy Good's optimism. He proceeds to say that electricity can cook perfectly; and it can provide at a reasonable cost all the hot water necessary. Yet he adds, almost in the next line, that, "You *cannot* economically produce a large quantity of hot water electrically at the moment it is wanted;" and a little later he suggests the use of a small closed stove for the purpose, though previously stating that electricity can provide at a reasonable cost all the hot water necessary. Such statements jostle each other in a very uncomfortable manner. He also asserts that, though a large quantity of water cannot be heated electrically at the moment it is wanted, it cannot be done by any other method. The experience of Percy Good is very, very narrow. Even a gas-geyser—which he describes as "horrible" (why, we do not know)—he believes takes as much as fifteen minutes for 30 gallons! That is to say, it does its work in such a lethargic manner that it only supplies at the rate of 2 gallons of hot water per minute. This awful expenditure of time compares with a statement in an article by "A Domestic User" in the "Electrical Times." He actually boiled 2 gallons of water in 90 minutes over one of the "Tricity" 800-watt hot-plates. After such express speed as this, gas must take a back place. The economy of electrifying a house is shown by Percy Good's estimate that, in a house "holding" a family of six persons and four servants, the cost of cooking and heating hot water by electricity would amount to (say) £80 to £100 per annum; and this would be a paying proposition, as one servant less could do the work. In our humble opinion, the head of a household who can afford an average of £2 a week for fuel for cooking and water-heating only would not be prepared to reduce the number of his domestic staff. Suppose a family of ten and no servants, and the income of the great majority of our fellow countrymen, where is the £80 to £100 to come from for

cooking and water-heating? Will electricity soon be in universal use in the modern household?

Mr. F. S. Grogan has written a letter to the "Electrician" commenting upon some criticism that appeared in the "Memoranda" a fortnight since, and for which his mental vivacity and his pen provided the base. There are also in the current issue of our contemporary a few remarks by the editorial supervisor of the "Commercial Supplement" of that paper. As the present "Memoranda" were written and in type before the publication of our contemporary, we are unable this week to deal with these seriously written contributions to a topic of current interest—the abuse of the gas-cooker as a salient feature of electric-oven propaganda.

PERSONAL.

Mr. WILLIAM ARNOTT, the Manager of the South African Lighting Association, Limited, is leaving Port Elizabeth for a holiday in England—travelling home by the East Coast route.

We learn from a local paper that the Chesterfield Gas and Water Board last Wednesday appointed Mr. J. FERGUSON BELL, of Derby, their Commercial Adviser and Consulting Engineer. In view of the recent disaster at Ilkeston, instructions were given to Mr. Bell to inspect the Board's gasholders and report.

Consequent upon the retirement of Mr. Joseph Tysoe, two additions have been made to the staff at the East Greenwich station of the South Metropolitan Gas Company. Mr. R. H. COLLINS has been appointed Assistant-Engineer, and Mr. J. D. C. HUNTER, one of the Employee-Directors, as Chief Clerk.

Mr. D. V. HOLLINGWORTH, F.C.S., the Chief Chemist at the Salford Corporation Gas-Works, has been appointed Manager of the new "Still" coke-ovens and bye-product recovery plant of the Birchenwood Colliery Company, and expects to take up his duties in about a month's time. We understand that Mr. Hollingworth will have charge of the ovens, tar and sulphate of ammonia plant, as well as plant for the refining of tar products. It was at the Royal Technical Institute, Salford, that he received his education; and for the past eight years he has been engaged at the Salford Gas-Works—first as Assistant, and afterwards as Chief Chemist. Previously he was Chemist at the Stretford Gas-Works—a position he held for about three years. Among the certificates gained by Mr. Hollingworth are the full technological certificate in "Gas Engineering" (Honours), a like certificate, with Honours, in "Coal Tar Distillation and Intermediate Products," and Honours in "Organic and Inorganic Chemistry." Mr. Hollingworth is President-Elect of the Manchester District Junior Gas Association.

OBITUARY.

Mr. JAMES WHITE, who died suddenly on Monday last week, was the Managing-Director of Messrs. Thomas Allan and Sons, Limited, of Thornaby-on-Tees.

The death took place recently of Mr. JOHN CAMDEN HAYWARD, of Farningham, a well-known Solicitor and public man. Among the many offices he held was that of Secretary to the Dartford Gas Company.

The death occurred suddenly on the 10th ult., of Herr OSKAR PINTSCH, the second son of Julius Pintsch, the founder of the firm of that name. Deceased had nearly attained the age of 69. He was associated with his elder brother Richard for many years in the management of its business. It was due to his initiative that the manufacture of gas-meters was started by the firm in Germany about the year 1851. Previously all the gas-meters used in that country had been imported.

The death occurred last Friday, after an attack of pleurisy, of Mr. ARTHUR BARNSLEY SHAW, barrister-at-law, whose name has appeared from time to time in our columns in connection with the parliamentary and legal work of the Metropolitan Water Board, for which he was generally retained. He read for the Bar in the chambers of Lord Justice Fletcher Moulton, and had for years enjoyed a considerable practice. He was only in his 51st year.

The death has occurred of Mr. J. W. SCHOFIELD, the Manager to the Huddersfield Corporation Water-Works. Mr. Schofield, who was 55 years of age, had been in the service of the Corporation for more than forty years. He was appointed Water-Works Manager in 1891, in succession to the late Mr. Stanway. He had a great deal to do with the construction of the Blackmoorfoot, Deerhill, Wessenden Head, Butterley, and Blakeley reservoirs; and he designed and superintended the execution of several important works entirely without expert engineering advice.

The new Director of the South Metropolitan Gas Company (Mr. Laurence W. S. Rostron) occupies the opening pages of the current number of the "Co-Partnership Journal" with an article on "Co-Partnership Housing." He gives tabulated statistics showing that the amount invested in co-partnership tenants' societies has increased from £38,917 in 1903 to £617,933 in 1909. The figures for 1910 are incomplete; but those available show a total of £795,600. An excellent portrait of the author is given as a frontispiece to the magazine.

THE GASLIGHT AND COKE COMPANY.

THE following is the report on the working of the Company during the six months ending Dec. 31, which, with the accounts (an abstract of which appears on p. 374) will be submitted to the proprietors on Friday.

The accounts for the past half year show that, after providing for fixed charges, setting aside £15,000 towards the redemption fund, and contributing £20,000 to the new special purposes fund, there remains a profit balance of £409,865 2s. 11d. The amount brought forward from the previous half year was £699,350 1s. 7d. There is therefore a total available balance of £1,109,215 4s. 6d., out of which the Directors recommend the payment of a dividend on the ordinary stock at the rate of £4 14s. 8d. per cent. per annum, which will absorb £382,467 10s. 8d., and leave the sum of £726,747 13s. 10d. to be carried forward to the credit of the current half year.

The exceptional heat of the summer, followed by a mild winter, has necessarily had considerable effect upon the sales of gas, which, as compared with the corresponding period of 1910, show a decrease of 0·96 per cent. for the half year. As the first six months showed an increase of 4¾ per cent., the result is an increase of 1·88 per cent. for the year 1911.

There has been an increase during the six months of 14,665 consumers, and of 32,772 in the number of gas-stoves sold and let on hire.

The situation in the coal trade gives cause for anxiety. The Directors believe, however, that, even if such a calamity as a general stoppage of work at the mines should occur, the Company would be able to continue an uninterrupted supply of gas during the time any such stoppage might last.

It is satisfactory to be able to state that the firm tone of the residuals market, which has been a feature of recent half-yearly reports, is well maintained.

The amalgamation of the Barking Gas Company and the Chigwell, Loughton, and Woodford Gas Company with the Gaslight and Coke Company took place as from the 1st inst., and gas manufacture has been discontinued at the works of the two former Companies.

The Directors have pleasure in reminding the proprietors that the Company's Charter is this year one hundred years old—having been granted in April, 1812.

The Court of Directors has been furnished by the several engineers of the manufacturing and distributing departments respectively with the usual certificates that all the Company's works and plant have been maintained in thorough efficiency.

CORBET WOODALL, Governor.

Horseferry Road, Westminster, S.W., Jan. 19, 1912.

SOUTH METROPOLITAN GAS COMPANY.

THE following is the report of the Directors of the Company for the six months ended the 31st of December, which, with the accounts [see p. 375], will be presented to the proprietors at the ordinary half-yearly meeting on the 14th inst.

The results of the past half-year's working provide an increase of £6395 in the surplus carried forward, after payment of debenture interest and sliding-scale dividend at the rate of £5 9s. 4d. per cent. per annum.

Owing to the abnormally mild weather experienced in London, there has been a falling-off in gas consumption of 2·45 per cent. The reduced income from gas has, however, been more than made up by the improved return from residual products.

The use of high-power gas lighting has been considerably extended, and there are now 1870 lamps of this type connected to the Company's mains. An improved form of inverted burner has been designed for indoor lighting, and has already become very popular.

The make of gas per ton of coal shows a further improvement on the figures hitherto reached—having now risen to 12,392 cubic feet. The cost of purification has increased by reason of the extended use of lime caused by working to a higher standard of purity. As the outcome of a considerable amount of experiment, plant on a large scale has been working at one of the stations for achieving the same end by less objectionable means, and with such good results that it is proposed to extend the experiment still further during the current year.

The supply of coal has been a recurring source of anxiety since the Coal Mines Regulation (Eight Hours) Act became law. Endeavour has been made to meet the seriousness of an interrupted supply by laying down large stocks, for which exceptional facilities exist at the East Greenwich works.

Strenuous efforts were made by a Committee representing all grades of the workmen to secure exemption for their sick fund from the provisions of the National Insurance Act, but without success.

The Company's co-partnership continues to justify the hopes founded upon it; and the employees of all ranks never worked more harmoniously for its success. A memorial statue of the late Chairman, the gift of the shareholders, officers, and workmen, and erected in the courtyard of the chief offices, was recently unveiled by Earl Grey.

By the death of Mr. Robert Morton, the Board has lost a colleague whose counsels and experience were for twenty-five years of the highest value to its deliberations. At the special general meeting held on the 20th of November, Mr. Laurence W. S. Rostron was elected to fill the vacancy.

Two Directors (Mr. John Mews and Mr. Frank Bush) and one Auditor (Mr. Charles Mortimer) retire by rotation. They are eligible, and offer themselves for re-election. Mr. George Maughan Footner resigned the position he held as Auditor from 1895, and his decease has been since announced. Mr. Charles P. Crookenden, F.C.A., a duly qualified proprietor, has signified his intention to be a candidate for this office.

709, *Old Kent Road, S.E.*, CHARLES CARPENTER, Chairman.
Jan. 31, 1912.

GAS LEGISLATION FOR 1912.

[FIFTH ARTICLE—PROVISIONAL ORDERS.]

NOTICE of the Provisional Orders that have been lodged with the Board of Trade, the Local Government Board, and the Scottish Office will complete our review of the projected gas legislation for the coming session.

Treating first the Company Orders to be dealt with by the Board of Trade, the one promoted by the Cambridge University and Town Gaslight Company claims attention. An extension of the limits of supply is sought, so as to include Great Shelford, Little Shelford, Stapleford, Impington, and Fulbourn, within which extended area the Company ask for the right to charge 6d. per 1000 cubic feet in excess of the sum from time to time charged for gas within the limits under their existing Acts. There are also provisions relating to the Company's co-partnership scheme, one of which is to empower the issuing to the trustees from time to time of such amount of stock (without previously offering it for sale by public auction or tender) as they may require to purchase under the scheme. Other provisions under this head are similar to those usually included in co-partnership gas companies' Acts. [*Parliamentary Agents: Messrs. Rees and Freres.*]

Extension of limits and further capital powers are desired by the Cleethorpes Gas Company. They wish to annex to their present area the parish of Humberstone, and such parts of the parishes of Scartho and Waltham as lie eastward of the Great Northern Railway, all in the rural district of Grimsby. As to capital, sanction is sought to the raising of any further sums not exceeding in the whole £100,000 by the creation and issue of new ordinary stock; and, in addition, borrowing powers on the usual lines of one-third. The dividend on the additional capital is limited to 5 per cent., subject to reduction or increase in accordance with section 16 [dividend dependent on price charged] of the Company's Act of 1900. Authority is asked to the creation of a special purposes fund. In the extended limits of supply, it is suggested that the price of gas shall be 4s. 3d. per 1000 cubic feet, subject to reduction or increase under the sliding scale provisions. It is proposed to repeal previous illuminating power and testing clauses, and to substitute a standard of 14 candles, tested by the "Metropolitan" No. 2 burner. A stand-by clause is included referable to private supplies of gas for power or other purposes not being domestic purposes. [*Parliamentary Agents: Messrs. R. W. Cooper and Sons.*]

The Conisborough Gas Company, Limited, ask for powers to raise further share capital to the amount of £8000, provided that the total share capital of the undertaking shall not exceed £20,000. A higher dividend than 7 per cent. is not to be paid on the new ordinary capital, and 5 per cent. on the part issued as preference. Borrowing powers are asked for up to one-third of the amount of the issued capital. Sections of the Company's Order of 1903, it is proposed shall be repealed; and the illuminating power standard be prescribed at 14 candles, with the testing provisions on modern lines. A stand-by clause relating to both private gas plants and electricity supply are among those that succeed. The model prepayment clause it is suggested shall be varied by allowing an extra charge of 1s. 3d. if a cooking-stove is included. The normal 10d. is the proposed excess for meter and fittings; but for a meter without fittings, an allowance of 8d. is asked for. The authority to form an insurance fund given by the Company's Order of 1903, it is proposed to supersede by powers for a special purposes fund. [*Parliamentary Agents: Messrs. Torr and Co.*]

Mr. J. F. Kelley and Mr. C. B. Tully are the promoters of the Elham Gas Order, in which they ask authority to construct gasworks and to trade in the parishes of Lyminge, Elham, Postling, and Stanford. It is proposed that the capital shall not exceed £15,000, with one-third borrowing. A piece of land measuring about 3¾ acres is scheduled for the works. For gas having a standard of 14 candles (tested by the "Metropolitan" No. 2 burner), a maximum price of 5s. is suggested. The other clauses are all of the usual form. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

The Hatfield (Yorks.) Gaslight and Coke Company, Limited, propose that their limits of supply shall be the parish of Hatfield (including Hatfield Woodhouse) and the parish or township of Stainforth. It is contemplated that the share capital of the undertaking shall not exceed £10,000, consisting of the original capital of £1660, and of additional capital not exceeding £8340. The dividend specified for the original capital is 10 per cent., and 7 per cent. on the additional capital issued as ordinary, and 6 per cent. on that issued as preference. Borrowing powers are requested at the customary one-third rate. The usual manufacturing and supply powers have part in the Order. As to the illuminating standard, 14 candles is prescribed; the modern testing conditions applying. The maximum price of gas is placed at 5s. 2d. per 1000 cubic feet; and the model prepayment meter clause is varied by 8d. being suggested as the excess where a meter is supplied without fittings. [*Parliamentary Agents: Messrs. White, Borrett, and Black.*]

The Knottingley Gas Company are desirous of increasing their capital powers to £20,000, consisting of the ordinary "A" share capital already raised of £6600, of £2200 "B" capital, and £11,200 additional capital. The "B" capital, it is contemplated, shall be issued to the holders of the shares in the "A" capital rateably according to their respective holdings of such capital as fully paid up; and they are to enjoy the same rights and privileges as the "A" capital. Regarding dividend, it is to be on the "A" capital, at the rate of 10 per cent., on the "B" capital 5 per cent., and on the additional capital 7 per cent. Borrowing powers on the usual scale are sought. Provision is made for the creation of special purposes and reserve funds. With a standard price of 5s. per 1000 cubic feet, the promoters are proposing the application of the sliding scale as follows: For variations of a penny in price, changes in dividend at the rates of 5s. per cent. on the 10 per cent. shares, 3s. 6d. per cent. on the 7 per cent. capital, and 2s. 6d. per cent. on the 5 per cent. capital. An illuminating power standard of 14 candles is now desired, with the current testing clauses; the proposal carrying with it the repeal of certain sections of the Company's Act of 1856. [*Parliamentary Agents: Messrs. Blundell, Gordon, and Co.*]

A short Order introduced by the Swansea Gas Company is to give them manufacturing powers over certain scheduled land. The land is part of the Forest Farm, belonging to His Grace the Duke of Beaufort. It contains 25 acres, 2 roods, 13 poles, and is situated in the parish of Llansamlet and county borough of Swansea. The land is bounded on the north by the Duffryn Steel and Tin Plate Works, on the south by a further part of the Forest Farm, on the east by a brook, and on the west partly by the Morriston branch of the Midland Railway and partly by works known as the Lower Forest Iron Foundry. [*Parliamentary Agents: Messrs. R. W. Cooper and Sons.*]

The Thurles Gas Company are forward with an Order, in which they ask for their limits of supply to be defined. The area embraces the townlands in the parish of Thurles, in which is included the urban district of Thurles. The townlands, some 46 in number are cited; but we will not attempt to reproduce the names. The share capital is placed at £14,000, consisting of the original share capital amounting to £5131 (of which £5000 are ordinary shares and £131 preference), and additional capital not exceeding £8869. The dividends are proposed at 10 per cent. on the original capital issued as ordinary, 7 per cent. on the additional ordinary capital, and 6 per cent. on the parts of both original and additional issued as preference. Borrowing powers are proposed at one-third. Special purposes and reserve funds are provided for. The customary manufacturing and trading powers appear. A standard price of 5s. 6d. is contemplated, with the sliding-scale on the usual terms. The prescribed illuminating power is 14 candles, tested by the "Metropolitan" No. 2 burner. [*Parliamentary Agent: Mr. Robert J. Sheehy.*]

The Tipperary Gas Company, Limited, have given notice of an Order, which, in the first place, specifies their limits of supply. These embrace the urban district of Tipperary, and certain named townlands. It is contemplated that the share capital shall not exceed £17,000, consisting of the original share capital, amounting to £10,000 (of which £8500 are ordinary shares, and £1500 preference), and additional capital not exceeding £7000. The dividends proposed are 10 per cent. on the original ordinary capital and 5 per cent. on the part issued as preference; and, in respect of the additional capital, 7 per cent. on the part issued as ordinary, and 6 per cent. on that raised as preference. Borrowing powers on the lines of one-third are desired. Special purposes and reserve funds clauses appear. Manufacturing and supply powers are in common terms. A standard price of 5s. is proposed, with the sliding-scale operating under the usual conditions. Tested by the "Metropolitan" No. 2 burner, the standard illuminating power is placed at 14 candles. [*Parliamentary Agents: Messrs. R. W. Cooper and Sons.*]

The Welwyn, Knebworth, and District Gas Company are asking for the definition of their area of supply in the manner set forth in the Order now before us. They also propose that the share capital shall not exceed £12,000, consisting of the share capital of £6000 already raised, and of additional capital not exceeding £6000. Concerning dividends, the original ordinary capital is to be entitled to a dividend of 10 per cent., the additional ordinary to 7 per cent., and the preference capital to 6 per cent. The issued capital will carry one-third borrowing powers. The manufacturing clause is succeeded by one for the protection of the Hertfordshire County Council and the Rural District Council. It is provided in this that pipes shall, if possible, be laid or constructed at such a depth not exceeding 2 ft. 6 in. below the surface of the road as the Council may reasonably direct; and the Council have prevailed upon the promoters to agree to the exemption of the Council from liability for damage to the

Company's underground plant in respect of any injury occasioned by a steam-roller or other engine not exceeding 15 tons in weight. As tested by the "Metropolitan" No. 2 burner, the standard of illuminating power is put at 14 candles. The maximum price of gas is proposed at 4s. 9d. per 1000 cubic feet. [*Parliamentary Agent: Mr. R. A. Read.*]

Notwithstanding the amalgamation scheme in which they are involved with the South Suburban Gas Company, the West Kent Company are asking for manufacturing powers in respect of a piece of land belonging to them at Erith, and containing 5 acres, 6 roods, 14¼ perches. On the north-east of the site runs the River Thames. [*Parliamentary Agents: Messrs. R. W. Cooper and Sons.*]

Turning next to the Local Government Board Gas Orders, there are only four for notice.

The Bala Gas Order is to obtain authority from the Board for the purchase by the District Council of the works of the Bala Gas Company, Limited. The limits of the area of supply are the boundaries of the district; but the Council ask to be allowed, with the consent of the Penllyn Rural District Council, to supply gas to premises outside the limits. All the clauses are in ordinary form—a little deviation being the proposal that the standard illuminating power shall be 13 candles, as tested by the "Metropolitan" No. 2 burner. The price of gas, it is suggested, shall not exceed 6s. per 1000 cubic feet. Borrowing powers are to be provided for through the Local Government Board; no specific amount being mentioned in the Order. In connection with the disposal of the profits, it is provided that no part shall be carried to the district fund when the price of gas to the consumers exceeds 3s. per 1000 cubic feet. It is also to be stipulated that the Council shall keep separate records of the gas supplied to private consumers and for public lighting respectively; and the price charged for public lighting shall not be less than that charged to private consumers by more than 10 per cent.; nor are the Council to defray any of the charges or expenses of carrying this Order into execution other than payments required to be made in respect of money borrowed on mortgage of the district fund and general district rate out of that fund or rate when the price of gas to private consumers is less than 5s. 6d. per 1000 cubic feet. [*Parliamentary Agents: Messrs. T. D. Jones and Co.*

The Coalville District Council are asking for sanction to the use of certain scheduled lands for manufacturing purposes. Stand-by clauses in respect of both gas and electricity are sought. The sections of the Council's Act of 1899 referring to quality of gas and test-burner, it is proposed to annul, and to substitute a standard illuminating power of 14 candles, tested by the "Metropolitan" No. 2 burner. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Harrington District Council are asking for the confirmation of an agreement made between the Harrington Gas Company and themselves for the sale and purchase of the concern for £7100, with stocks of coal, coke, lime, gas, and residuals being paid for under agreement or by arbitration. Manufacturing and supply powers are desired. The Council suggest working to a standard illuminating power of 14 candles, tested by the "Metropolitan" No. 2 burner. The maximum price of gas is placed at 5s. per 1000 cubic feet. The Council ask for a stand-by clause in relation to electricity; but we do not notice private gas plants mentioned. With regard to borrowing powers, the Council will look to the Local Government Board to sanction what they require. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Hipperholme District Council have applied to the Board for power to supply gas in the area of Bailiff Bridge. The maximum price of gas is placed at 5s. 6d. per 1000 cubic feet; while the price charged for public lighting is not to be less than that charged to private consumers by more than 10 per cent. Borrowing powers are to be by the sanction of the Local Government Board. In this case, the residue (if any) of the revenue, it is proposed, shall be carried to the credit of the district fund; but no part is to be so transferred when the price of gas to private consumers exceeds 4s. per 1000 cubic feet. The Council are not to defray any charges or expenses of carrying the Order into execution other than payments required to be made in respect of money borrowed on mortgage of the general district fund and general district rate out of that fund or rate when the price of gas to private consumers is less than 5s. 6d. per 1000 cubic feet. Nothing in the Order is to take away the rights of the Halifax and Bradford Corporations to supply gas within the Bailiff Bridge gas area in the event of failure on the part of the Council to provide and maintain a supply of gas there. [*Clerk to the Council: Mr. G. Wharton Thompson.*]

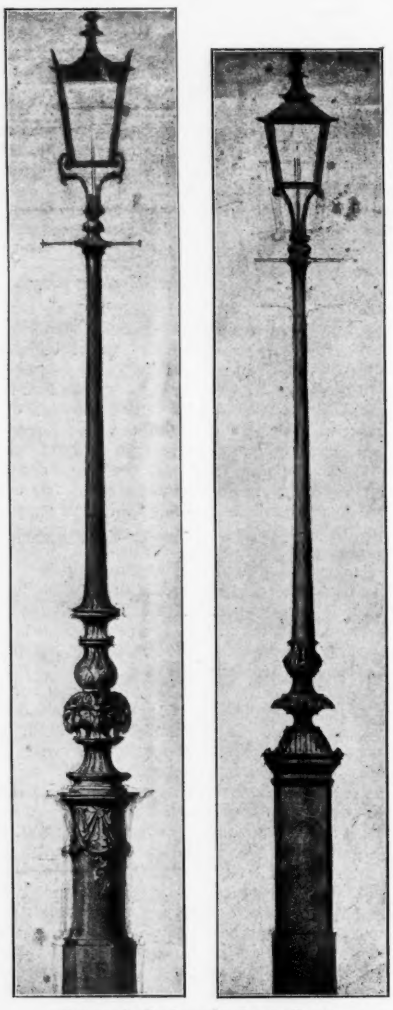
Coming to the Scotch Orders, the Arbroath Corporation are asking for sanction to borrow any sum of money for the general purposes of their undertaking not exceeding £15,000. They also desire that the standard illuminating power of the gas shall be 14 candles, tested by the "Metropolitan" No. 2 burner. The right to charge differential prices is sought. The old 10 and 15 per cent. discounts clause is proposed, with this addition: "Further, for gas consumed for special purposes, discounts or rebates not exceeding in any case 30 per cent." "The Corporation," says one of the final clauses, "shall have full power to take all such steps as they may consider necessary or expedient to promote the use and sale of gas manufactured by them and the residual products thereof." [*Parliamentary Agents: Messrs. Wm. Robertson and Co.*]

The Glasgow Corporation have introduced a boundary extension scheme. It is proposed to annex the royal burgh of Rutherglen, and the police burghs of Govan, Partick, and Pollokshaws, and several suburban areas, all of which are supplied by the Corporation with drainage, gas, and water. [*Parliamentary Agents: Messrs. Martin and Co.*]

In a further measure, the Glasgow Corporation contemplate extending the limits of gas supply as defined by their 1910 Act so as to include the parish of Mearns, which will form part of what is known by the Act named as the "supplementary supply district." It is asked that so much of the Busby and District Gas Order of 1911 as relates to the area intended to be taken over shall be repealed. [*Parliamentary Agents: Messrs. Martin and Co.*]

LAMP-POSTS DESIGNS BY ALFRED STEVENS.

In the "Journal" for the 23rd ult. (p. 212), reference was made to an address delivered by Mr. E. F. Strange, at the Architectural Association, on Alfred Stevens, the designer of the Wellington Monument in St. Paul's Cathedral. It was then mentioned that Mr. Stevens had also designed lamp-posts, and that an exhibition of them at South Kensington had been projected. Two of the designs, given below, appeared in a recent issue of the "Builder," from which we reproduce them.



Stevens's Designs for Lamp-Posts.

Gaseous Combustion as Applied to Furnace Heating.—A special short course of lectures on "Gaseous Combustion as Applied to Furnace Heating" is to be given by Mr. A. W. Onslow at the London County Council Westminster Technical Institute, Vincent Square, S.W., on Tuesday evenings, commencing Feb. 20. The fee for the course is 2s. 6d.; but students already in attendance at the Institute will be admitted free. The lectures are designed to give a practical demonstration of modern gaseous heating for industrial purposes, and will be illustrated by diagrams and designs worked out during each lecture. The following is the syllabus: High-pressure and low-pressure gas heating; case hardening, annealing, tempering, and smelting furnaces; drying ovens and tanks; brazing; compressing plants; burners; piping; refractory materials to be used; building-up of temporary furnaces for various purposes.

THE QUALITY OF LONDON GAS

In the Year 1911.

PARTICULARS were given in the "JOURNAL" in the course of last year of the results of the testings of the gas supplied by the three Metropolitan Gas Companies during the first three quarters of the year [see Vols. CXIV., p. 511; CXV., p. 534; and CXVI., p. 235]. It will now be appropriate to give the similar results for the fourth quarter of the year, and finally to give a brief summary for the whole year similar to that which was given in the "JOURNAL" last year [Vol. CXIII., p. 290] for the year 1910 and the two preceding years. The figures in all cases are compiled from the weekly returns issued by the London County Council of the results of daily testings carried out in the nineteen testing-places under the control of the Council.

Fourth Quarter of 1911.

The period referred to as the fourth quarter is the thirteen weeks ended Dec. 30, 1911. According to custom, the corresponding figures for the fourth quarters of 1909 and 1910 are included in the tables for the sake of comparison. Fuller details as to the figures for these years will be found in previous articles.

ILLUMINATING POWER.

Table I. shows the average results of the testings of illuminating power with the standard No. 2 "Metropolitan" argand and with the prescribed flat-flame burner for each Company during the fourth quarter of each year. It will be seen that, as compared with the corresponding quarter of 1910, there has been little change in the average illuminating power of the gas, though the tendency generally is slightly downwards. The minimum results in the quarter for the testings with the standard argand burner were 13·14 candles for the Gaslight and Coke Company, 13·97 for the South Metropolitan Company, and 12·08 for the Commercial Company. The minima of the Gaslight and Coke and South Metropolitan Companies are less than one candle below the prescribed illuminating power of 14 candles, and consequently they

TABLE I.—*Averages of all the Testings of Illuminating Power for the Fourth Quarter of the Year [Candles].*

Burner	No. 2 "Metropolitan" Argand.			Flat-Flame.		
Year	1909.	1910.	1911.	1909.	1910.	1911.
Gaslight and Coke Company	15·82	14·93	14·82	10·10	8·56	8·47
South Metropolitan Gas Company	16·12	15·72	15·69	10·38	9·91	9·81
Commercial Gas Company	14·57	14·81	14·65	8·75	8·78	8·43

are entitled, by the London Gas Act, 1905, to have set off against the deficiency on those days any surplus there may have been on the immediately preceding and following days. It is probable, therefore—though the reports are not sufficiently detailed to show this—that even the return of 13·14 candles for the Gaslight and Coke Company will not have involved them in liability to a forfeiture, because the average of the results for the three days will have been above the permissible limit. The minimum of 12·08 candles for the Commercial Company being, however, more than one candle below the prescribed illuminating power will render them liable to a forfeiture in respect thereof, subject to the Chief Gas Examiner being satisfied that the default was not due to unavoidable cause or accident.

CALORIFIC POWER.

Table II. gives a summary of the results of the testings for calorific power of the gas supplied by each Company in the fourth quarter of the year. It will be seen that the average calorific power of the gas supplied by the Gaslight and Coke Company is almost the same as in the corresponding quarter of 1910; while that of the South Metropolitan Gas Company has fallen by nearly two calories, and that of the Commercial Company by rather more. The average figures for last quarter for the Gaslight and Coke and Commercial Companies are, by a coincidence, identical. The difference in the average calorific power of the coal gas supplied by the South Metropolitan Company and of the mixed gas supplied by the other two Companies is now somewhat less than it was in 1909, owing to the rather more rapid rate at which the South Metropolitan Company have lowered the quality in this respect during the two years. Nevertheless, the coal gas of this Company is still as much as 7·1 calories gross and 6·2 calories net per cubic foot above the mixed gas of the other Companies. It will be remembered that the Gaslight and Coke Company are the only Metropolitan Gas Company who are liable to incur a forfeiture in respect of low calorific power. In the case of this Company, the gas must not fall below 112·5 calories net on the average of three consecutive days' testings, or below 106·5 calories net per cubic foot on a single day's testing. It will be seen that the Company maintained their gas throughout the quarter well above the prescribed standard. The table also shows that the minimum result for the Commercial Company was like-

TABLE II.—*Summary of Testings of Calorific Power (Gross and Net) for the Fourth Quarter of the Year [Calories per Cubic Foot].*

Company.	Average.			Maximum.			Minimum.		
	1909.	1910.	1911.	1909.	1910.	1911.	1909.	1910.	1911.
Gaslight and Coke—									
Gross	140·9	137·6	137·1	151·6	148·5	149·5	129·9	127·5	129·4
Net	125·5	122·6	122·3	139·6	132·0	132·9	116·0	112·9	115·4
South Metropolitan—									
Gross	148·7	146·1	144·2	170·3	156·3	156·4	137·7	135·0	124·4
Net	132·1	130·2	128·5	152·7	139·4	140·6	122·0	120·3	110·2
Commercial—									
Gross	140·4	140·0	137·1	151·7	152·9	151·3	132·3	127·5	127·9
Net	125·0	124·7	122·3	133·9	136·6	136·6	116·2	114·0	113·9

wise above the prescribed standard of the Gaslight and Coke Company. On one occasion, the South Metropolitan Company had a result of 110·2 calories net; but the minima reported in other weeks of the quarter for this Company were generally higher than those for the other two Companies.

SULPHUR.

Table III. shows the average and maximum result of the testings for the amount of sulphur contained in the gas during the last quarter of each year. There is little change in the amount of sulphur in the Gaslight and Coke Company's supply; but the fall which has been taking place in the amount in the gas of the South Metropolitan Company during the last two years continues. The average for the past quarter is slightly below 25 grains per 100 cubic feet, with a maximum of 46·2, and a minimum of 8 grains.

TABLE III.—*Summary of Testings of the Sulphur in London Gas for the Fourth Quarter of the Year [Grains per 100 Cubic Feet].*

Company.	Average.			Maximum.		
	1909.	1910	1911.	1909.	1910.	1911.
Gaslight and Coke Company	33·4	34·0	33·9	58·7	53·5	57·8
South Metropolitan Gas Company	38·6	28·8	24·9	75·7	58·0	46·2
Commercial Gas Company	30·6	26·9	25·2	49·9	46 0	45·2

In the corresponding quarter three years previously the average for this Company was 47·2 grains, and the maximum 98·7; so that it will be seen that the sulphur content has to all intents and purposes been halved in the course of three years. There is also a small diminution in the average amount of sulphur in the gas supplied by the Commercial Company. No very high maxima have been reported during the quarter; the highest figure being 57·8 grains for the Gaslight and Coke Company.

Results for the Complete Year.

The results for the past year, summarized in Tables IV., V., VI., and VII., refer to the 52 weeks ended Dec. 30, 1911; and the comparative figures for the two preceding years refer, as to 1909, to the 53 weeks ended Jan. 1, 1910, and as to 1910 to the 52 weeks ended Dec. 31, 1910.

ILLUMINATING POWER.

Table IV. gives the average results for each complete year of the testings of illuminating power. It will be seen that in two years the average illuminating power of the gas supplied by the Gaslight and Coke Company has fallen by 1·62 candles; but it has to be remembered that the prescribed standard of illuminating power for this Company was 16 candles in 1909, and was reduced to 14 candles as from Jan 1, 1910. Hence it would appear that the Company have not yet taken full advantage of the reduction of two candles in the statutory standard of illuminating

TABLE IV.—*Averages of all the Testings of Illuminating Power for the Whole Year [Candles].*

Burner	No. 2 "Metropolitan" Argand.			Flat-Flame.		
Year	1909.	1910.	1911.	1909.	1910.	1911.
Gaslight and Coke Company	16·52	15·22	14·90	11·30	9·04	8·59
South Metropolitan Gas Company	16·34	15·86	15·70	10·70	10·15	9·90
Commercial Gas Company	14·75	14·72	14·60	8·96	8·68	8·47

power for their gas. The average illuminating power of the gas supplied by the South Metropolitan Company has fallen by 0·64 candle in two years, but is still 1·7 candles above the statutory requirement of 14 candles. The Commercial Company have been working throughout to a 14-candle standard; and there is only a trifling fall in the average illuminating power of their gas in the two years. The flat-flame results call for little comment, more especially as in the case of the Gaslight and Coke Company the testings with the flat-flame burner are made less frequently

than with the standard argand burner, and on other days. The minimum results of illuminating power during the year have, in the case of all the Companies, been those for the fourth quarter, which are already reported and commented on above.

Calorific Power.

The results of the testings of calorific power throughout the three years are summarized in Table V. It will be seen that, corresponding with a drop of 1·62 candles in illuminating power, there has been a drop of 6·8 calories gross and 6·1 calories net in the calorific power of the gas supplied by the Gaslight and Coke Company. The Commercial Company, who likewise supply a mixed gas, have corresponding to a fall of 0·15 candle in illuminating power, a fall of 3·7 calories gross and 3·2 calories net per cubic foot in the two years.

Table V.—*Summary of Testings of Calorific Power (Gross and Net) for the Whole Year [Calories per Cubic Foot].*

Company.	Average.			Maximum.			Minimum.		
	1909	1910.	1911.	1909	1910.	1911.	1909.	1910.	1911.
Gaslight and Coke—									
Gross	144·3	138·0	137·5	162·0	154·8	149·5	129·9	126 6	127·8
Net	128·8	122·9	122·7	144·6	139·4	132·9	116·0	112·6	114·3
South Metropolitan—									
Gross	148·9	146·6	144·6	170·3	158·0	156·4	130·3	135·0	124·4
Net	132·1	131·1	128 9	152·7	140·9	140·6	117·3	120·1	110·2
Commercial—									
Gross	140·8	138·4	137·1	151·7	159·4	151·3	130 0	118·3	123·6
Net	125·6	123·4	122·4	136·5	143·0	136·6	115·2	106·1	110·0

A comparison of these figures indicates the futility of attempting to show for mixed gas that a given fall in illuminating power will be attended by any certain fall in calorific power. There is no definite relation between the two sets of figures, since either the illuminating power or the calorific power of mixed gas may be varied within fairly wide limits quite independently of the other quality. The South Metropolitan Company's coal gas, in falling 0·64 candle in illuminating power during the two years, has fallen 4·3 calories gross and 3·2 calories net in calorific power.

It will be seen from the minimum returns of calorific power in the year 1911, as shown in the table, that throughout the year the Gaslight and Coke Company have kept well above the statutory requirements (*vide supra*) in regard to the calorific power of the gas supplied by them.

Sulphur.

Table VI. shows the average and maximum amounts of sulphur in the gas supplied by the three Companies throughout the three years. The most significant feature of these figures is the great

Table VI.—*Summary of Testings of the Sulphur in London Gas for the Whole Year [Grains per 100 Cubic Feet].*

Company.	Average.			Maximum.		
	1909.	1910.	1911.	1909.	1910.	1911.
Gaslight and Coke Company . .	35·4	35·3	34·0	58·8	71·9	62·9
South Metropolitan Gas Company. .	43 1	32·0	26·9	107·3	70·7	57·9
Commercial Gas Company	34·0	28·0	28·8	72·2	52·7	61·7

reduction achieved in two years by the South Metropolitan Company in the sulphur content of their gas.

Pressure.

The results of the testings of pressure made during the year 1911 are summarized in Table VII. It will be seen by comparison with the corresponding table for the year 1910 ["Journal" Vol. CXIII., p. 291] that there has been a great reduction in the number of testings of pressure, which are made at the street-lamp standards. Experience has evidently convinced the controlling

Table VII.—*Maximum and Minimum Results of the Testings of Pressure in 1911 [Tenths of an Inch].*

Company.	No. of Testings in the Year.	Highest Pressure Observed.	Lowest Pressure Observed.
Gaslight and Coke Company . .	13	41	33
South Metropolitan Gas Company.	7	45	31
Commercial Gas Company . . .	2	34	30

authority that in modern conditions of gas supply it is waste of time to make such testings in anticipation of finding evening pressures below 10-10ths and day pressures below 6-10ths of an inch. The minimum pressure observed during the year was 30-10ths. The uniformity of the pressure in the mains, as shown by these returns, is, however, remarkable, and reflects the highest credit on the distributing staffs of the Companies.

THE PINTSCH HIGH-PRESSURE GAS SYSTEM.

Compact, Reliable, and Simple.

A sign of the extending favour of the high-pressure system of gas lighting is the increased activity in this country among those in commercial competition with such plants, which have been brought to a high pitch of perfection in duty and reliability. The Brimsdown Lamp Works, Limited, are busy with the Pintsch patent gas-compressors and high-pressure lamps, which have, in the form in which they are now presented, earned for themselves an excellent reputation on the Continent. For the prosecution of high-pressure business, the Company have opened a sales department at 15, Farringdon Avenue, E.C., where both plant and lamps can be seen in operation.

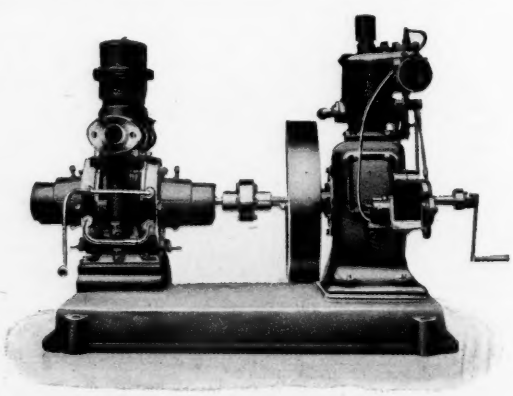
The Demonstration Plant.

The first thing that favourably strikes one on seeing the plant with which demonstration is made is its compactness. Here is a little compressor standing on a shelf, and occupying only about 8 square inches of space and a height of 1 foot; and in a cupboard below is a small electric motor (any other source of power that is conveniently at hand will do) to drive it. There is nothing more, other than the connections; and yet this diminutive plant is capable of supplying 210 cubic feet per hour at a regulated pressure of 60 inches, or more as desired, yielding, at the 60 inches, a minimum efficiency of 55 candles per cubic foot, though higher duties have been photometrically recorded. But the 55 candles may be taken, allowing for variation of condition, to be a reliable standard of efficiency—the lamps, of course, responding with additional duty to all enhancement of conditions. The next thing that strikes one about the plant is its simplicity, which means easy management; so that any intelligent person, after a very brief schooling with it, can give, with confidence, the little attention that is necessary to start it to work. This simplicity has part in the third point, and that is the technical merit found in the uncomplicated design and construction of the compressor, the reliable and uniform operation of which is a vital matter in the performance of the lamps.

The Pintsch compressor with which demonstration is made is the smallest in the range of sizes. It is what is known as the No. 0 self-contained compressor. The electric motor which drives it is of ¼ H.P., as that is the most reliable of the smallest sizes of motor, though ⅛ H.P. would be more than sufficient. For demonstration purposes, and so that every claim can be attested, there is a pressure-gauge attached, and a Pintsch experimental meter, by the reading of which for one minute, the hourly consumption is disclosed. To the meter (which by-the-by has been tested by the Imperial Technical Laboratory at Charlottenburg) is attached a mercury pressure-gauge, which attests that the pressure on the meter coincides with the pressure shown by the gauge on the outlet side of the compressor. There is one incidental point with reference to this high-pressure experimental meter; and it is the difficulty that has been experienced in securing a meter for high-pressure gas that is positively accurate. However, for this meter, exact calculations have been made; so that readings can be corrected for slip according to pressure. For example, running at 60 inches pressure, the allowance for slip is 20 per cent. off the registered consumption. Another item in the demonstration equipment is a simple photometer available for measuring, after dark, the illuminating power of the lamps at any angle. Thus it will be seen that the means of demonstration are complete in every detail. It is not a question, therefore, of taking for granted, or "with a grain of salt" (as inclination dictates), anything that is said; but there are means for verifying them.

Compressor Details.

Examining the details of the No. 0 compressor (which is in nearly all respects representative of the larger types), it is found fitted with bye-pass and automatic control valves and non-return



A Pintsch Compressor Coupled Direct to a Gardner Motor.

valve. The compressor itself is of the rotary type with six blades; and running at 650 revolutions, it supplies 210 cubic feet of gas an hour at 60 inches pressure. If run at 1200 revolutions, it will

supply 320 cubic feet. On top of the compressor is the pressure-regulator. This is on the Pintsch diaphragm principle—which has been used extensively in the manufacture of automatic and distance lighters for lighthouse work and coast-light buoys. This is a very sensitive regulator. It will keep the gas supply at constant pressure whether only a 100-candle power lamp is being used or lamps to the full capacity of the machine. The steadiness of the gauge while lamps are running at 60 inches is such that lightly pressing the finger on the weights (which had been exposed for the purpose) sent the pressure up to 120 inches, and then with more pressure to 200 inches. It is remarkable with what readiness the controller responds to changes, and how reliable it is in the matter of constancy under any pressure. Of course, with this small No. 0 compressor, at 200 inches, one does not get the same efficiency in the matter of output as at the 60 inches for which the machine is designed. But tests showed that its range is not a strictly limited one. The blades of the compressor are of a special composition; there are no springs of any kind in the machine; and there appears to be nothing to get out of order. The compressor is made to live, and to work regularly and well.

The compressors are kept in stock in sizes from 210 cubic feet up to 20,000 cubic feet. We have dealt with the No. 0 machine; and the capacities of the other stock sizes are as follows:

Compressor No.	Revs. per Min.	Output. Cub. Ft. per Hour.
1	500	350
"	650	450
"	750	550
2	500	900
"	650	1,050
"	750	1,250
3	500	1,600
"	650	2,000
"	750	2,300
4	500	3,550
5	500	7,050
6	500	14,100

The No. 0 size is not water-jacketed, but all the others are, owing to the fact that they are run up to pressures of 7¼ lbs. per square inch. Another difference is that in Nos. 1 to 6, the compressors have double bearings and ring lubrication; while in No. 0, the bearings are only single. In Nos. 1 to 6, again, there is a separate non-return valve, which prevents back-pressure on the meter; while in the No. 0 size, the non-return valve on the inlet is part and parcel of the design of the compressor. Through this valve the gas flows under normal pressure; and it opens when the compressor is sucking. Should there be an excess of compressed gas, the bye-pass regulator comes into action; and the excess is returned to the suction side of the compressor. This closes the valve, and prevents more gas being drawn in until the excess has been again absorbed. Nothing could be simpler—in fact, the compressor supplying gas for lighting the grounds at the Brimsdown works is set in operation, and nobody even thinks of looking at it. It may be left; and it will not be found wanting.

The High-Pressure Lamps.

The Pintsch high-pressure gas-lamps are of simple but strong structure; and they are made for all candle powers from 100 and 200 for inside lighting, up to 5000-candle power for the large lamps for outside or any other lighting where the higher power single units are required. They can be obtained up to 1500-candle power with single mantles. The 1500-candle power size is also constructed for two mantles; the 2000-candle power, for three mantles. In fact, the stock patterns can be varied in any way to suit the inclinations of consumers. The lamps have top levers or side levers to each burner, so that part can be extinguished if necessary. As already remarked, the lamps are of strong build; and the constituent members are renewable. They are nippled according to the quality of the gas upon which they are to be run; and very careful attention has been paid to the air regulation. The burner-nozzles are made of fire-proof material, which is unaffected by the greatest variations of temperature. To the nozzles the mantles are tied with asbestos thread; so that the mantles are, it is understood, less costly than those mounted on collars. A duplicate set of nozzles—the nozzles being interchangeable—enables one to go about the work of mantle renewal economically and expeditiously.

The lamps can be fitted with the Pintsch automatic pressure-lighter; and by its means the lamps are lighted and extinguished by merely starting or discontinuing the running of the compressor. Under normal pressure, the bye-pass burns very low. When the pressure is raised, the flame is lengthened, and the burners are ignited. When the lamps are in use, the bye-pass flame is extinguished; as the compressor is stopped, the bye-pass lights up again, and is ready for duty when the lighting hours return.

A Test and the Result.

A 1000-candle power lamp was under test at the time of the investigation made for the purposes of this article. The lamp had the previous evening, it was stated, returned a duty photometrically of 1230 candles. With the pressure now regulated to 60 inches, the mantle was found to be incandescent all over; there was no dark spot at its base. The corrected gas consumption was 20⅓ cubic feet. When the photometrical test was made, there was still a little daylight about, but the reading was 1128 candles, which is practically equal to 56 candles per cubic foot. Had the test been made later when there was no trace of external light reaching the photometer, there is no doubt that the 1230 candles of the previous evening would have been attained; and that would have given an efficiency of 61 candles. But the Company say they prefer to limit their claims as to efficiency, as said before, to about 55 candles, so as to have in hand, and to the credit of the lamps, anything realized above that under favourable conditions.

The Pintsch 1000-Candle Power High-Pressure Gas-Lamp.

THE ILKESTON DISASTER.

By W. Gadd, C.E., F.R.M.S.

In view of the very serious nature of the recent misfortune at Ilkeston, so fully reported in the columns of the "Journal," and as the gasholder in question was constructed on the spiral-guide system, it may interest readers to have the thoughts of the inventor of this method of gasholder guidance before them. These are now put forward, chiefly with the object of assisting in the elucidation of the primary cause of the catastrophe, if such be yet possible, as assuredly it ought to be.

The very clear report of Mr. Samuel Glover, together with the evidence of Mr. Humphrys and Mr. Bell, make it quite certain that an explosion was not the first cause, and, secondly, that the tank side was rent asunder. Hence, we know too well the final act of the drama, but not the initial weakness which led to it, although the idea of explosion is clearly eliminated.

According to the evidence adduced, the escape and firing of the gas took place *before* the opening in the tank was sufficient to let out the devastating flood of water. This forms an important clue; for gas will escape from a telescopic holder of any description whatsoever, if the outer lift is arrested long enough during its descent to permit of the inner lift uncupping. But the inner lift of a spirally-guided holder, in such circumstances, cannot tilt on one side, but will descend quite vertically at every point in the circle, until it reaches its lowest position in the outer lift, or meets with some obstruction in its turn. Now, if this uncupping took place at the time assumed by the evidence, there must have been some reason for the prior arrest of the descending outer lift.

As a gasholder bell is, in working, supported by the confined gas, there is very little pressure, under normal conditions, upon the spiral-guides of the system, beyond the friction needed to turn the floating bell upon its axis. When under wind pressure, however, there is an outward angular thrust upon the tank side, which, in a concrete tank sunk *below* the ground level, may be almost negligible. But, in the case of a steel tank *above* ground, it is necessary to provide, in addition to the strength required to resist

the bursting pressure of the water, an augmentation which will effectively take up the strains due to wind. In the absence of evidence to the contrary, it may be assumed that this necessary provision of strength, for abnormal occasions, was fully provided for by the contractors. Assuming this to be so, the question arises, What could arrest the outer lift in its descent, after two or three years of perfectly smooth and correct working, up to the time of the disaster?

The possibilities may be theoretically stated as:

1.—Distortion of the tank at some point from subsidence of the foundation, to an extent sufficient to bind the rollers on the guides. This, however, may be readily proved or disposed of by a careful levelling observation of the whole tank site.

2.—A sudden distortion from wind pressure upon a weak portion of the tank side.

3.—Expansion or contraction of the circle of the outer lift over and above that which was provided for in the plans.

4.—Wilful placing of an obstruction in the way of the descending lift, by wedging the rollers or otherwise. Or the accidental entrance of a foreign body effecting the same result.

5.—The slowly accumulating action of the constant force of the water pressure, augmented by occasional wind force, upon a weak or over-hardened plate, which culminated at last in disruption.

Of these possibilities, the first named is capable of causing the damage; but this can at once be settled one way or the other. (2) Might occur independently, but more probably as the last episode in (5). In the case of (3), considering that the temperature of the time was not excessively low, this theory may probably be ruled-out. As to (4), this is doubtless exceedingly improbable; and, indeed, it is almost certain that the keen eyes of Mr. Humphrys, immediately after the occurrence, would at once have detected any evidence of either accident or design under this head, which would have been left on the site. We are therefore confronted with possible causes (1) and (5); and assuming (1) is disposed of by levelling, we are left with (5) alone.

If (5) were the cause, we can readily construct a picture of the sequence of events, as follows: First, the part has become slightly distorted for some time prior to the occurrence, but not sufficiently to impede the action of the outer lift. We can then suppose that the wind, on the morning of the final scene, was sufficiently strong to cause a further distortion, short of rupture, but enough to bind the rollers on the guides, uncup the inner lift, and allow the gas to escape and fire, when the run-down of the lift to the bottom would form sufficient shock to complete an opening in the plate or plates, and the rush of water would finish the sequence of events detailed by the evidence.

Whether or not the ruptured plates were in this way to blame, would require a very careful microscopic examination to determine. The writer is, however, aware that occasionally such exist, from over-hardening, and are rather difficult to distinguish from their fellows, for the reason that they are in a condition to withstand the prescribed strain, *steadily* applied; but are unable to withstand a sudden shock or blow somewhat short of such normal strain.

In conclusion, no system of construction must be judged adversely because of either hidden flaws or defects in material, or misapplications of the system. With regard to the spiral system, it must be remembered that there are, in almost all parts of the world, a very large number in successful working, some of which have been in use for about twenty years; and therefore we have a right to conclude that the disaster under investigation is in no wise due to this method of guidance correctly applied.

The Woodall-Duckham Vertical Retort.—The Woodall-Duckham Vertical Retort and Oven Construction Company, Limited, of Palace Chambers, Westminster, have issued, in the form of a series of leaflets, very effectively printed in colours, particulars of their system for the continuous carbonization of coal in vertical retorts. Illustrations of the different portions of the plant accompany the descriptions, and the advantages claimed for the system are fully set forth. Very appropriately, the first leaflet is devoted to a short history of carbonization in vertical retorts from the time of Brunton, in 1828, to the patenting of the Woodall-Duckham system in 1910, with illustrations of each system. It shows at a glance the progress made.

Twenty-Five Years of the Welsbach Light.—Last Thursday, the Welsbach light had been before the English public for a quarter-of-a-century; an installation having been prepared for their inspection at the Marlborough Gallery, Pall Mall, on Feb. 1, 1887. The half-hundred lamps then shown astonished those who gazed at them, who probably little thought that the new light would be so universally employed as it now is. In the early years, while the Welsbach mantle was to be found in almost every café in Vienna, in London it was seen in only a few of the "A.B.C." tea-rooms. Now, after twenty-five years, it is difficult to say where it is not to be seen, for it is used by millions, both in houses of private consumers and in the street lamps of the public authorities. It is justly claimed to be the brightest and cheapest artificial light ever attempted. It has played a most important part in the progress of gas lighting; and continued growth in public favour may be cordially wished for it.

THE ILKESTON GASHOLDER.

By J. Ferguson Bell, M.Inst.C.E., of Derby.

In response to your request, it affords me pleasure to place on record a few of the uncontroversial facts in respect to the unfortunate disaster at Ilkeston. Before doing so, I should like to commend the Ilkeston Gas Committee, and their much-esteemed Manager (Mr. F. C. Humphrys), who not only possesses the full confidence of the Gas Committee and the members of the Town Council, but the town at large. They have met this deplorable accident with courage and determination to do what is best in the public interest, in a whole-hearted and thoughtful manner that bids well for the future, with thankfulness that the result of an accident of such magnitude was not attended with greater irreparable loss and destruction to property.

At their first meeting after the accident, the Gas Committee unanimously passed a vote of confidence and sympathy with Mr. Humphrys, which I know greatly helped to sustain and support him in an anxious, trying time—forming a welcome silver lining in the dark cloud, for which they receive not only their Manager's grateful thanks, but that of the gas industry at large.

Some three or four years ago the Ilkeston Gas-Works were enlarged and modernized, to provide for the increasing demands made upon them. Additional gasholder storage capacity being necessary, it was decided to erect a new spiral-guided two-lift gasholder (provision being made for a third lift to be added later), with steel tank standing entirely above ground, which is the one to which the accident happened on Monday afternoon, Jan. 8.

A contract was entered into on the 25th of October, 1908, with Messrs. C. & W. Walker, to supply, deliver, and erect upon foundations prepared by the Corporation a steel tank, 115 feet in diameter by 26 feet deep, with a spiral-guided two-lift gasholder. The inner or top lift was 108 ft., and outer lift 110 ft. 6 in. diameter respectively, each being 25 ft. 6 in. deep. When fully inflated the lifts contain 453,000 cubic feet of gas. At the time of the accident the holder was about three-parts full; so it would contain some 320,000 cubic feet, and was supplying the town.

For districts such as Ilkeston, where the ground is undermined, and other places where it is difficult to excavate any depth for brick or concrete tanks below ground (in consequence of water and other reasons), steel tanks possess many advantages. They are much cheaper in first cost; more expeditiously erected; and in cases of getting out of level, can more easily be put right.

During the last twenty years or more, steel or iron tanks for gasholders, oil storage, and other purposes have come very largely into use; and with increasing favour. In fact, of late years out of every hundred gasholders erected, at least eighty have steel tanks. For storage of oil in large quantities, they are practically exclusively used—some being no less than 250 feet in diameter; a very general height being 30 feet and upwards.

Below is a statement of the approximate number of steel tanks erected for gasholders with outside guide-framing, and spiral-guided holders similar in many respects to the one at Ilkeston, and also for storage of oil, &c., during the past twenty years, divided into periods of five years:—

	Steel Tanks erected for One to Four Lift Gasholders with Outside Guide Framing.	Steel Tanks erected for One to Four Lift Gasholders Spiral Guided.	Steel Tanks erected for storage of Oil, &c.
1892-1896 inclusive	49	19	29
1897-1901 ,,	78	28	51
1902-1906 ,,	95	54	70
1907-1911 ,,	91	98	89
	313	199	239

Tests at Rolling-Mills of the Steel Plates.

Cast No.	Dimensions of Piece. Size.		Area.	Ultimate Stress. Total.	Tons per Square Inch.	Elongation on 8 Inches.	Carbon.	Manganese.	Sulphur.	Phosphorus.
						Per Cent.				
62	1·50	·55	·825	22 6	27·3	27	·116	·70	·05	·07
131	,,	·56	·840	23·2	27·6	25	·119	·69	·05	·06
58	,,	·50	·750	20·6	27·4	27	·117	·70	·06	·07
49	,,	·43	·645	18·2	28·2	25	·119	·68	·07	·06
32	,,	·31	·465	12·9	27·7	24	·118	·69	·07	·06
102	,,	·25	·375	10·3	27·4	25·5	·115	·72	·05	·07
111	,,	,,	·375	10·4	27·7	23·5	·119	·68	·05	·06
114	,,	,,	·375	10·6	28·1	23·0	·120	·67	·05	·06
182	,,	,,	·375	10·7	28·5	23·5	·118	·69	·07	·07
67	,,	,,	·375	10·2	27·2	26·0	·118	·68	·07	·06

Test of Steel Plates from Side of Tank adjacent to where it Ripped.

Before Testing.		After Testing.	
Length	8·00 in.	Breadth	1·96 in.
Breadth	2·40 ,,	Thickness	0·25 ,,
Thickness	0·38 ,,	Fractured area	0·49 ,,
Original area	0·912 ,,	Reduction of area	46·3 p. ct.
Breaking stress on piece	25·0 tons.		
,, ,, per sq. in.	27·4 ,,		

Remarks: Slightly Laminated.

Strength of Steel Tank to Resist Bursting Pressure Due to Water.

CALCULATIONS FOR STEEL PLATES.

—	Bottom Tier.	Second Tier.	Third Tier.	Fourth Tier.	Fifth Tier.	Sixth (Top) Tier.
	$\frac{9}{16}$ in. Plates, 4 ft. $3\frac{1}{4}$ in. Centres. Double Riveted Lap Joints. $\frac{7}{8}$ in. Diameter Rivets.	$\frac{1}{2}$ in. Plates, 4 ft. $3\frac{1}{4}$ in. Centres. Double Riveted Lap Joints, $\frac{7}{8}$ in. Diameter Rivets.	$\frac{7}{16}$ in. Plates, 4 ft. $3\frac{1}{4}$ in. Centres. Double Riveted Lap Joints. $\frac{7}{8}$ in. Diameter Rivets.	$\frac{3}{8}$ in. Plates, 4 ft. $3\frac{1}{4}$ in. Centres. Double Riveted Lap Joints. $\frac{7}{8}$ in. Diameter Rivets.	$\frac{5}{16}$ in. Plates, 4 ft. $3\frac{1}{4}$ in. Centres. Double Riveted Lap Joints. $\frac{7}{8}$ in. Diameter Rivets.	$\frac{1}{4}$ in. Plates, 4 ft. $3\frac{1}{4}$ in. Centres. Single Riveted Lap Joints. $\frac{7}{8}$ in. Diameter Rivets.
Effective head of water taken at two-thirds down tier	26 ft. $-\left\{2\frac{3}{4}\text{ in.} + \frac{1}{3}(4\text{ ft. }3\frac{1}{4}\text{ in.})\right\}$ = 26 ft. − 1 ft. $7\frac{3}{4}$ in. = 24 ft. $4\frac{1}{4}$ in.	26ft. $-\left\{4\text{ ft. }6\text{ in.} + \frac{1}{3}(4\text{ ft. }3\frac{1}{4}\text{ in.})\right\}$ = 26 ft. − 5 ft. 11 in. = 20 ft. 1 in.	26ft. $-\left\{8\text{ ft. }9\frac{1}{4}\text{ in.} + \frac{1}{3}(4\text{ ft. }3\frac{1}{4}\text{ in.})\right\}$ = 26 ft. − 10 ft. $2\frac{1}{4}$ in. = 15 ft. $9\frac{3}{4}$ in.	26ft. $-\left\{13\text{ft. }0\frac{1}{2}\text{in.} + \frac{1}{3}(4\text{ ft. }3\frac{1}{4}\text{in.})\right\}$ = 26 ft. − 14 ft. $5\frac{1}{2}$ in. = 11 ft. $6\frac{1}{2}$ in.	26ft. $-\left\{17\text{ ft. }3\frac{3}{4}\text{ in.} + \frac{1}{3}(4\text{ft. }3\frac{1}{4}\text{in.})\right\}$ = 26 ft. − 18 ft. $8\frac{3}{4}$ in. = 7 ft. $3\frac{1}{4}$ in.	26ft. $-\left\{21\text{ft. }7\text{in.} + \frac{1}{3}(4\text{ ft. }3\frac{1}{4}\text{ in.})\right\}$ = 26 ft. − 23 ft. = 3 ft.
Bursting pressure due to water $\frac{\text{Pressure} \times \text{radius} \times \text{depth of plate}}{2240}$ Tons	$\frac{24\cdot3542 \times 62\cdot3 \times 57\cdot5 \times 4\cdot2708}{2240}$ = 166·25 tons	$\frac{20\cdot0833 \times 62\cdot3 \times 57\cdot5 \times 4\cdot2708}{2240}$ = 138 tons	$\frac{15\cdot8125 \times 62\cdot3 \times 57\cdot5 \times 4\cdot2708}{2240}$ = 108 tons	$\frac{11\cdot5417 \times 62\cdot3 \times 57\cdot5 \times 4\cdot2708}{2240}$ = 79 tons	$\frac{7\cdot2708 \times 62\cdot3 \times 57\cdot5 \times 4\cdot2708}{2240}$ = 50 tons	$\frac{3 \times 62\cdot3 \times 57\cdot5 \times 4\cdot2708}{2240}$ = 20·5 tons
Net area of Plate Between circumferential seams	(15 holes $\frac{15}{16}$ in. diameter) $\left\{51\cdot25 - (15 \times \frac{15}{16})\right\}\frac{9}{16}$ = 20·9 square inches	(18 holes $\frac{13}{16}$ in. diameter) $\left\{51\cdot25 - (18 \times \frac{13}{16})\right\}\frac{1}{2}$ = 18·32 square inches	(18 holes $\frac{13}{16}$ in. diameter) $\left\{51\cdot25 - (18 \times \frac{13}{16})\right\}\frac{7}{16}$ = 16·02 square inches	(22 holes $\frac{13}{16}$ in. diameter) $\left\{51\cdot25 - (22 \times \frac{13}{16})\right\}\frac{3}{8}$ = 13·52 square inches	(22 holes $\frac{13}{16}$ in. diameter) $\left\{51\cdot25 - (22 \times \frac{13}{16})\right\}\frac{5}{16}$ = 11·29 square inches	(27 holes $\frac{13}{16}$ in. diameter) $\left\{51\cdot25 - (27 \times \frac{13}{16})\right\}\frac{1}{4}$ = 8·17 square inches
Stress per square inch $\frac{\text{Bursting pressure}}{\text{Net area of plate}}$	$\frac{166\cdot25}{20\cdot9}$ = 7·96 tons per square inch	$\frac{138}{18\cdot32}$ = 7·54 tons per square inch	$\frac{108}{16\cdot02}$ = 6·74 tons per square inch	$\frac{79}{13\cdot52}$ = 5·84 tons per square inch	$\frac{50}{11\cdot29}$ = 4·43 tons per square inch	$\frac{20\cdot5}{8\cdot17}$ = 2·51 tons per square inch
Factor of Safety. Taking the ultimate stress at 27 tons per square inch $\frac{\text{Ultimate stress}}{\text{Stress per square inch}}$	$\frac{27}{7\cdot96}$ = 3·4	$\frac{27}{7\cdot54}$ = 3·59	$\frac{27}{6\cdot74}$ = 4	$\frac{27}{5\cdot84}$ = 4·62	$\frac{27}{4\cdot43}$ = 6·1	$\frac{27}{2\cdot51}$ = 10·75

Diagram Comparison of Values of Plate to Load.

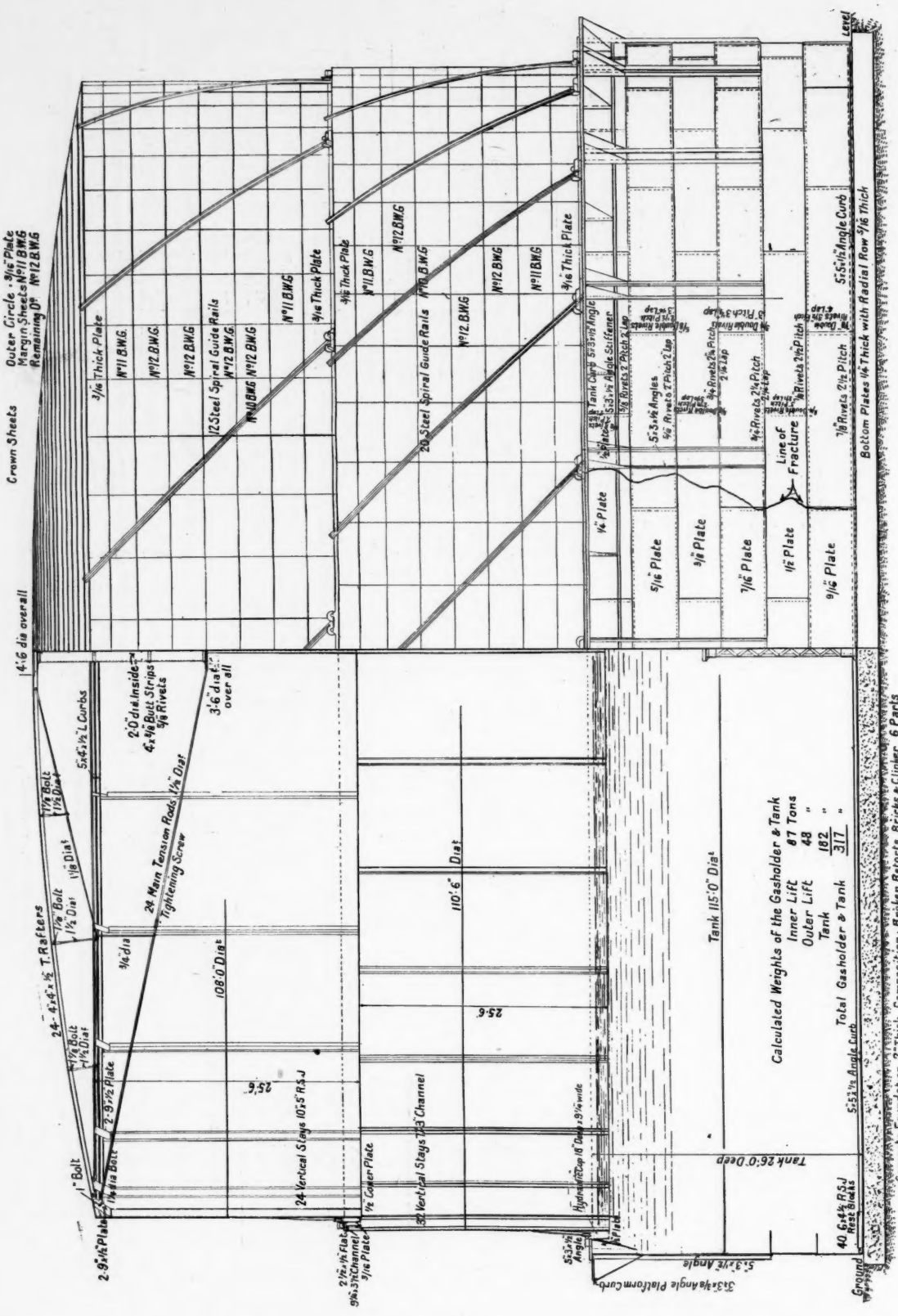
	LOAD VALUES ON LEFT OF VERTICAL LINE.			PLATE VALUES ON RIGHT OF VERTICAL LINE.		
Load Value— $\frac{\text{Bursting Pressure}}{\text{Depth of plate}}$	$\frac{166\cdot25}{51\cdot25}$ = 3·245	$\frac{138}{51\cdot25}$ = 2·691	$\frac{108}{51\cdot25}$ = 2·109	$\frac{79}{51\cdot25}$ = 1·541	$\frac{50}{51\cdot25}$ = 0·976	$\frac{20\cdot5}{51\cdot25}$ = 0·4
Plate Value— $\frac{\text{Net area of plate} \times \text{Ultimate stress}}{\text{Depth of plate}}$	$\frac{20\cdot9 \times 27}{51\cdot25}$ = 11	$\frac{18\cdot32 \times 27}{51\cdot25}$ = 9 66	$\frac{16\cdot02 \times 27}{51\cdot25}$ = 8·44	$\frac{13\cdot52 \times 27}{51\cdot25}$ = 7·134	$\frac{11\cdot29 \times 27}{51\cdot25}$ = 5·95	$\frac{8\cdot17 \times 27}{51\cdot25}$ = 4·305

Thus, during the last twenty years, over 750 steel tanks have been erected; the accident to the one at Ilkeston being the first on record. This indicates the safety of iron or steel tanks; and it seems a pity your "perplexed" correspondent did not wait for the full authentic report of the accident in last week's "Journal" before rushing into print.

At the adjourned inquiry, no condemnation was made in respect to spiral-guided gasholders, but simply an endeavour to explain the cause which led up to the disaster; and, of course, the Coroner at such an inquiry did not want to go too much into technical matters. He simply had to ascertain if the unfortunate death of the young woman was due to an accident, and if there was any blame attached to anyone, in consequence of reasonable care and forethought not being duly exercised. Happily, after a very careful hearing being given to all the evidence, the Coroner and Jury had no difficulty in coming to the conclusion that it was a pure accident—no blame being attached to anyone.

The safety or otherwise of large spiral-guided gasholders must be left to those responsible for their erection; but for smaller and medium sized holders, there is no doubt as to their stability and safety, as is proved by the number erected and working in every way satisfactorily. They are somewhat cheaper in the first instance to erect; but they require more attention, and it is necessary that the guide-rollers should from time to time be carefully examined and if needful adjusted, so that each may take its fair share of work, and the rollers run smoothly in the guide-rails.

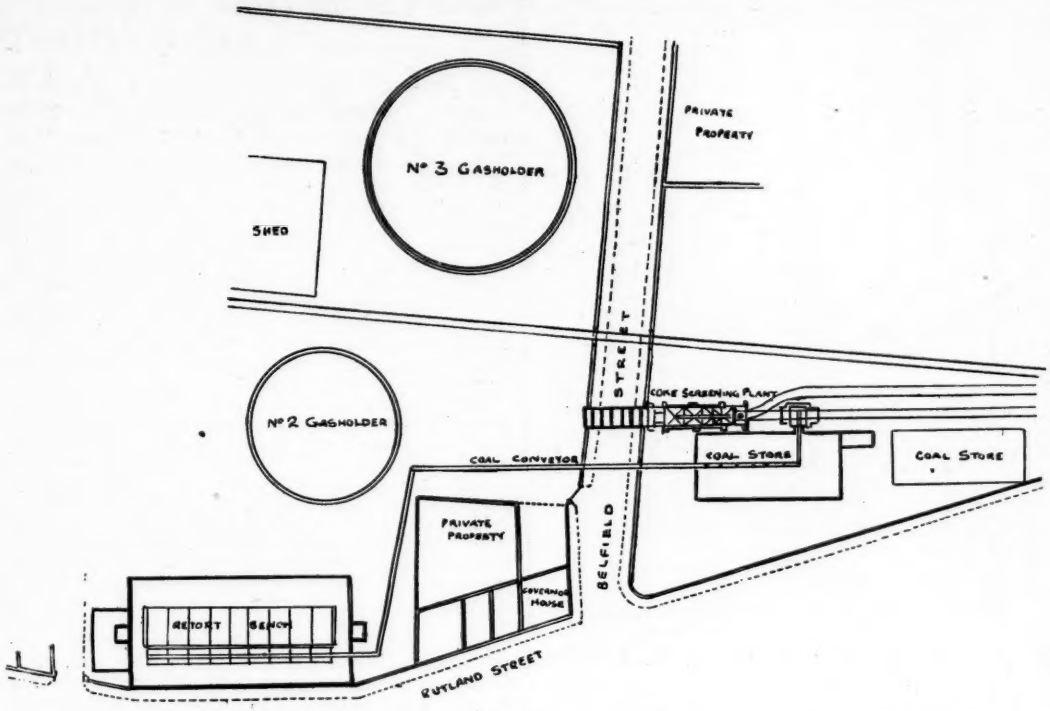
It should be remembered that a spiral-guided gasholder is more



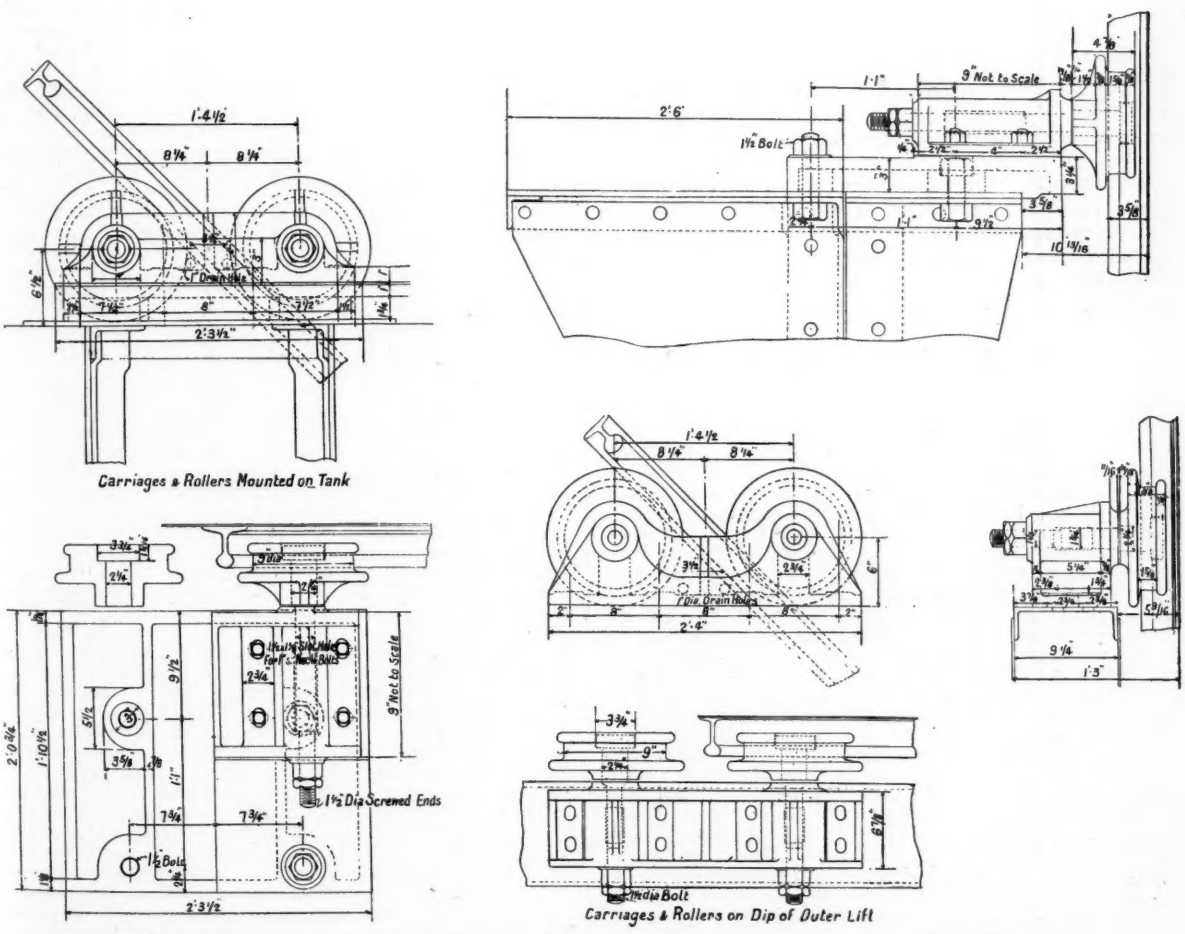
THE SPIRAL-GUIDED GASHOLDER AND STEEL TANK AT ILKESTON.

in the nature of a machine than a column-guided one. Hence the necessity of extra care to see that the holder receives proper attention. I am of opinion that all spindles on the guide-roller carriages of spiral holders should be efficiently lubricated by a Stauffer or similar automatic grease lubricator, as I have noticed on several of this type of holders, some of the spindles set-fast, thereby converting the guide-wheel into a skidder bearing hard on the guide-rail, and causing unnecessary friction and strain,

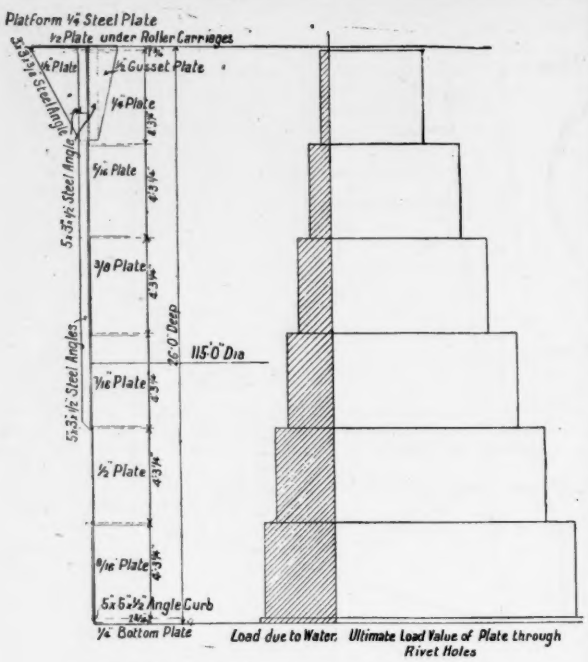
Seeing the interest taken in the Ilkeston gasholder disaster, I send a drawing herewith made by me since the accident, showing the spiral-guided gasholder and steel tank, and giving full particulars in respect to the tank both as to thickness of each ring of plates, riveted joints, with the size of the top and bottom angle curbs, as the point of interest is in the failure of the tank. In addition, I am sending a detailed drawing of the rollers and carriages, along with a diagram showing the bursting stress in each



BLOCK PLAN OF THE ILKESTON GAS-WORKS—SHOWING THE POSITION OF THE DAMAGED HOLDER.



DETAILS OF CARRIAGES AND ROLLERS FOR THE SPIRAL-GUIDED GASHOLDER AT ILKESTON.



Strength of Steel Tank to Resist the Bursting Pressure due to the Water.

ring of tank plates taken at the centre of the liquid pressure, and the strength of plates to indicate the factor of safety allowed.

On the diagram I have figured out the calculations, and in addition have given the steel works test of the tank plates, with a test recently made of a part of the ⅜-inch tank plates taken from near where the fracture occurred. The line of fracture is shown on the drawing from the top to the bottom of the tank. It started and finished, as one would expect, at the weakest places—*i.e.*, at the top adjacent to the tank carriage, where the greatest strain would be thrown by the floating gasholder, and at the bottom of the tank at the riveted joint.

We learn, or should do, by experience; and without attempting to enter into the fundamental or primary cause of this unforeseen accident, it should induce all who have the care of gasholders—more especially spiral-guided ones—to see that they are not only kept in perfect working condition, but periodically examined; and the result of such examinations recorded in a book or card-index for future reference.

I purpose later, with your permission, to give your readers a more full and detailed account of my investigations in respect to this deplorable accident, in the hope that a more thorough acquaintance with the circumstances by actual observations may perhaps lead to some useful knowledge, capable of practical application.

RAISING A WATER-TANK.

The Marysville Water Company, of Marysville (Cal.), have an 80 ft. by 41 ft. brick building with walls 24 inches thick at a height of 45 feet. Through the centre of the building a 24-inch brick wall extends to the second storey, with a brick buttress at each end to the top of the third storey. On this middle wall six steel columns carry a heavy steel girder. This structure carried a 79 ft. 8 in. by 40 ft. 9 in. tank 9 feet deep, holding 218,000 gallons. It is supported by twenty-five 15 inch I-beams which rest on the exterior brick walls and on the steel girder. The tank weighs about 70 tons empty, and about 900 tons when filled. The Company were able to give a pressure of about 22 lbs. with it. But this was not considered quite enough; so it was decided to raise the tank 20 feet, increasing the pressure to 30 lbs. Plans for the work were prepared, and the job was carried out. The general method of doing it was substantially as follows: Railroad ties were obtained for use as blocking, and with them 36 house-raising jack-screws were employed. About fifty men were engaged on the work. At a signal given each jack was given a quarter turn, and guides were set and levels taken to be certain that the lifting was even. The tank, I-beams, and girders were raised as a whole in this way to an elevation about 20 inches above their permanent position. The 24-inch exterior brick walls and the brick buttresses were then built up, new 20-feet steel columns were set on the old columns, each braced by four 8-inch I-beams fastened to plates set in the brick wall and angle-iron stays between them, and also braced by two 8-inch I-beams between the columns. The tank was then lowered to its permanent position. Though it was empty and exposed to the weather for three months during the work, when filled with water no leaks of any sort appeared.

WHAT WAS THE CAUSE OF THE ILKESTON CATASTROPHE?

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

Practically there is entire agreement between the conclusions arrived at by the two experts (Mr. J. Ferguson Bell and Mr. Samuel Glover) who were specially retained by the Corporation of Ilkeston, and the Engineer and Manager of the gas-works, as the result of their investigations of the cause and origin of the circumstances that resulted in the sudden destruction of one gasholder and tank, and, incidentally, to the total disablement of a second holder. A searching inspection has been made; and there is every reason to believe that the expert evidence tendered at the adjourned inquiry which was held on the 23rd ult. as to the death of an unfortunate victim by what may be called a side stroke rather than a direct consequence, covers all that is positively known, or can reasonably be conjectured, as to the happenings and sequence of events.

It is true that the evidence above alluded to has been, to some extent, challenged by a statement published subsequently in a local paper—made by a Mr. Hallam, who claims to have been an eye-witness. As already explained in the "Journal," the holder was situated at the north-east corner of the property, in close proximity to two thoroughfares meeting at right angles—viz., Belfield Street on the east, and Barker Gate on the north. As usual with gas-works, the boundary of the property abutting on these thoroughfares was marked by a wall, sufficiently high to prevent passers from seeing anything that might be going on in the works. Mr. Hallam was, at the time of the accident, "halfway" down Barker Gate, and apparently so near to the holder that it is most fortunate for his safety that the mischief was occurring on the south, and not on the north, side. But from his position on the north side, and with the boundary wall intervening, he really had to depend more on his ears than his eyes, and the scene of action was entirely beyond his view. He first heard a violent ripping noise, which he assumes to be due to the bursting of the tank, but which more probably indicated the disengaging of the inner lift. He then saw the holder begin to come down; but if the first act had been the ripping open of the tank, there would not be much "beginning" about the descent of the holder. He next observed the flooding of Belfield Street to a depth of some 3 feet, and, lastly, such a large and fierce flame that the heat drove him back up the street again. The local paper referred to somewhat rashly jumps to the conclusion, on this evidence, that the primary cause was the bursting of the tank. Mr. Hallam may have heard a noise, and seen the water before he saw the flame, from his standpoint. But Mr. Bostock, who was on the side immediately facing the burst, and only 45 yards distant, was first alarmed by the appearance of flame, and had time to gather his household together and rush into the cellar before the flood of water reached him. The effects of the current go to show that the light obstacles intervening between the gasholder and Mr. Bostock's house would not delay its course for any appreciable period of time. George Beckwith saw a "flash of light" before the water swept him off his legs. An inspection of the ruins goes to confirm this evidence; and it is scarcely conceivable that a tank, after nearly three years' efficient service—a period sufficiently long to ensure its being thoroughly tested by all possible variations in working, exposure to wind, weather, &c.—would at a minute's notice, with no preliminary warning, split vertically the whole depth, and tear away three parts of the circumference at the base, with such violence as to open out 40 feet or 50 feet on each side of the tank area, without the existence of some very distinct and powerful initiating cause.

At the time of the occurrence the inlet valve to the gasholder was closed, and the outlet open, for the supply of the requirements of the district. The quantity of gas in the holder has been put at 320,000 to 350,000 cubic feet. The delivering capacity of the outer lift was about 9600, and of the inner lift 9160 cubic feet per foot of depth. The inner lift being full, would account for about 230,000 cubic feet. Therefore the outer lift at the time contained about 100,000 cubic feet—sufficient to lift it to the extent of something more than 10 feet. Adding the depth of the lute, the outer lift was somewhere about 12 ft. 6 in., or half its depth, out of water at the time. One might expect that a holder, if inclined to work tight or "jam" at all, would be the more liable to do so at the time of quickest travel, either up or down—as when the maximum make was being turned in, and the outlet shut, or the maximum demand going out, with a closed inlet. But at 1.30 p.m. the rate of output would be not far from the minimum. The cooking demand—now so important as to call for morning as well as evening adjustment of pressure at the governor—falls off at 1 p.m. Gas-engines and technical appliances shut down for the dinner hour. The usual experience (to which there is no reason for believing Ilkeston an exception) is that the rate of consumption from 1.15 p.m. to 2 p.m. would be low, and certainly not sufficient to cause any unusual strain.

Under these circumstances, the locking or jamming of the outer lift that was probably the commencing act, occurred some appreciable time previously—perhaps before 1 o'clock, at which time the consumption would be greater. The diameter of the holder being large in comparison to the district (having been designed with a wise foresight of the probabilities of the future), it would from 1 to 1.30 p.m. be falling very slowly. Under normal circum-

stances of working, the outer lift would be descending, and the inner remain fully inflated, until such time as the outer lift took up its bearings on the rest-blocks at the bottom of the tank. But the effect of the outer lift sticking and remaining stationary was to bring the inner lift into action. It commenced to descend, and after a short time the lute was unsealed. But as the lute was 21 inches deep, a descent of a foot or so, representing over 9000 cubic feet of gas, was possible before this event took place. The pressure given by the inner lift was perhaps 40-10ths; so as long as more than 4 inches depth of the curtain attached to the outer lift remained below the water contained in the lute attached to the inner lift, no gas would escape. But on reaching the limit indicated by the pressure thrown by the inner lift, the seal would be forced, and gas would escape in such quantity that the seal would soon be cleared, and there would be a free outlet of gas, represented by the annular space between the curb on the outer and the side of the inner lift—a matter of at least 6 inches width. The inner lift would then be free to fall by its own weight, until it sealed itself in the water of the tank. According to theory, a holder should work perfectly level, and blowing, when it occurs, should be equally dispersed around the circumference. But in practice, many holders have a sufficient natural list to cause the blowing to commence at one particular part. The Ilkeston gas-holder may or may not have had a natural list; and it is not material whether or not this was so, because it might be expected that the sticking or jamming of the outer lift was attended with displacement from the horizontal—perhaps to the extent of some inches. Attention may here be directed to a fact that will be evident from the diameter of the tank and lifts respectively—that provision had been made for the addition at a future time of a third lift. Whether the extra leverage on the guides caused by the space of 2 ft. 3 in. between the outer lift and the side of the tank had any connection with the jamming, I would not pretend to say. In this case, there is good reason to believe that before the inner lift dropped there was a decided list towards the south side, and the force of the impact was concentrated at this part.

There is this important difference between a gasholder guided in the ordinary way, and the spiral-guide system—that in the first case the lift would fall with a direct vertical drop, taking the water equally all round. It would throw a great strain on the tank, but it would be spread and diffused fairly equally all round the circumference. Assuming a fairly strong welt round the top curb of the tank, this might take-up and successfully resist the force of the impact. But in the second case, the falling lift would tend to follow the guides, which are set at an angle of 45°. There would, in addition to the fall, be a rapidly accelerated rotary motion, which, following on the list of the outer lift, would tend to concentrate the impact to one point, or rather to a small proportion of the whole circumference. Whether an outside frame-guided holder would, under similar circumstances, land at as great a distance from its proper seating is an interesting speculation, but no more than a speculation. The outside framing would be of some assistance to the tank in resisting the impact; but when the tank ripped and opened, it would go by the board, leaving the holder free to follow an unimpeded course. The decided list on the outer lift, and the rapidly accelerated motion of the inner lift, would bring an almost irresistible percussive momentum on one part—in this instance on the south side—that affords a feasible explanation of the suddenness and the extent of the tearing, as above mentioned.

Not the least mysterious detail is how the gas became ignited. The nearest light on the works was in the retort-house, 120 yards away on the lee side of the holder. Yet the evidence is decided on the fact that flame was seen on the top or at the upper part of the holder at an early stage. It is impossible to mistake Mr. Bostock or Mr. Beckwith on this point. And it should be noted that the escape of large volumes of gas into the atmosphere was not necessarily coincident with the first appearance of flame. The 100,000 cubic feet of gas in the outer lift was rapidly displaced at a height of something more than 25 feet above ground—well above the roofs of the cottages which are supposed to be responsible for the ignition source; and yet it would probably be the ignition of this portion that furnished the signs of scorching on the top of the holder. In workmen's tenements, the fire (if such existed) would at that hour of the day be in the living room on the ground floor. If we blame the cottages for the ignition, the same must have occurred at or near ground level. As soon as flooding reached a large scale, one can understand that a powerful down-draught would be created, sufficient to draw the bulk of the gas and diffuse it over a considerable area at or near ground level. One might reasonably suggest that the ignition at the top of the holder, preceding the flooding, was the result of sparking caused by the grinding of metal against metal, or by the violent stripping of the tyre of a guide pulley.

The position and condition of the holder after coming to rest, furnishes something more than mere suggestions as to the course of events. It settled in the normal upright position, but some 42 or 43 feet to the south of its proper seating. The crown, including the inside framing, showed no special sign of injury, and as much might almost be said for all the inner lift, which had not run down to the full extent, but had locked or engaged with the outer lift some 2 feet above its usual rest position. There was (as will be seen by inspecting the illustrations) about 2 feet of the inner lift showing above the curb of the outer lift; and that it jammed before finally coming to rest is quite understandable from previous considerations. The upper part of the outer lift shows little displacement, and in some parts the sides are still perpendicular and plumb, but badly crumpled towards the lower portions at others, apparently by violently coming to ground. The injury to the bottom of the tank, or ploughing of the surface where the holder landed outside the tank foundation, is very slight. It would appear that the two forces—the vertical resultant due to the weight of the holder, and the horizontal one due to the escape and the spread of the water in a south-east direction—brought the bulky object to ground with a comparatively gentle movement, at an angle of 40° or so to the perpendicular. In the course of its descent, it might have heeled at a slight angle, 10° or so, towards the south, following the list above noticed. Touching ground first on the south and on the lower part of the circumference of the bottom curb, it would right itself with some violence by dropping into an upright position; and the observed condition is consistent with this assumption. There is a decided crumpling on the north side. In its horizontal travel it tore away the inlet-pipe, cutting it off clean at ground level, but did not injure the outlet-pipe, which is situated at some distance from the inlet and on the south-west side. The inlet was uncovered and left clear, while the outlet remained inside; and the outlet valve, which was situated near the exterior of the tank, was covered by the falling holder. The sheeting on the inside and the frame were quite clean, and in no way differed from the usual appearance of the inside of a holder that has been in use some years.

The atmosphere inside the holder was found to be "breathable" within a short time after the accident, though there were some 230,000 cubic feet of gas contained in the inner lift, with no way of escape except from the bottom. Probably the rush of water caused a rapid influx of air under the tilted part on the north side, sufficient to sweep out the lower part, at any rate, of the content. That this sweeping action was very rapid and efficient is shown by the absence of any sign of combustion inside the holder itself.

I have endeavoured to arrive at the most feasible explanation in answer to the question at the head of this article, and must admit that the paucity of positive evidence renders it something short of being satisfactory or conclusive. The whole period occupied by the catastrophe was so brief that it might be almost termed instantaneous, and precludes the possibility of intelligent or accurate observation of the sequence of events. After drawing such conclusions as are apparent from the extent of the damages and the position of the wrecked parts, there is much that is, and is likely to remain, a matter of conjecture. The chief difficulty is the absence of any evidence or indication of an exciting or primary cause, such as might be afforded if some structural defect had been discovered, or some object entangled in the guides or rollers between the outer lift and the tank.

CONCERNING THE CENTRIFUGAL TREATMENT OF CARBURETTED WATER-GAS TAR.

By J. M. Muller, of the Western Gas-Works, Amsterdam.

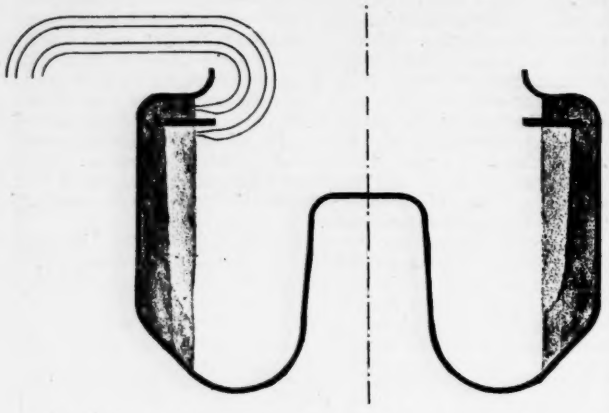
When, at the end of August, one set of Humphreys-Glasgow carburetted water-gas apparatus was put into operation at the Western Gas-Works, Amsterdam, and towards the middle of September a second set, we were confronted with the question, By what means can the tar produced be freed from water and rendered saleable? Generally, rather complicated separators are used for this purpose; and it was recognized that the problem was not one of the simplest. We have tried to solve the difficulty by means of centrifugal force, though we knew already that this method had been tried at various works without favourable result. It may be mentioned at once that these experiments have been a perfect success; and I therefore consider it of interest to the gas industry to make known the results obtained.

The arrangement is briefly as follows: The tar and water deposited in the scrubber and condenser are led to two round separators, 2·80 metres diameter, 3·50 metres deep, each divided into three compartments by means of baffle plates with openings. The tar from the first separator runs into an underground tank; while the water continues its way to a second separator, in which a further quantity of tar is separated from the water. This tar also flows into the same underground tank. The latter likewise receives the tar pumped from the syphons and that obtained from the Pelouze condenser. The water from the second separator, after cooling in the tank of the relief holder, is pumped back to the scrubber. Consequently, the whole of the tar produced is collected in one tank, which therefore contains floating tar as well as heavy tar and emulsion. Owing to the state of rest of the mixture, a further separation of the tar takes place to some extent in this tank. The tar used in the experiments with centrifugal treatment is pumped from it, and therefore contains everything present in raw carburetted water-gas tar—tar, water, emulsion, fine carbon formed by the decomposition of the gas oil, coke dust, and other impurities.

The first experiments were made with a centrifugal machine of the type of the "Baltic" (a small machine for the separation of cream from milk), worked by hand. The liquid was preheated to a temperature of 80° C., filtered through a sieve, and passed through the machine running at a speed of 6000 to 7000

revolutions per minute. Separation of tar and water took place immediately; but this pleasing result did not last long, for, after a few minutes running, the centrifugal machine became clogged, owing to the filling-up with emulsion of the small intermediate spaces between the various conical parts of the "Baltic" separator. Subsequently the tar was filtered through a cloth; but the result remained the same.

As, however, during a few moments a perfect separation of the tar and water had been observed, the experiment was not abandoned, but repeated with the ordinary Burmeister and Wain centrifugal machines, which have been used here for years for the centrifugal treatment of coal-gas tar. The illustration roughly represents this machine.



The tar is admitted into the bottom of the revolving drum, and is pushed upwards alongside the inner surface of the drum by the continually entering tar. Separation takes place, so that the solid particles cling to the inner surface of the drum, while the tar is thrown closely to this surface, and the water remains inwardly on this layer of tar. A steel ring is attached concentrically to the top of the drum, with its outer edge at a distance of a few millimetres from the surface of the drum. The heavier tar (shown by the dark in the illustration), rising outwards alongside the inner surface of the drum, forces its way through this space between the ring and the drum, and flows out above the ring, from which point it is taken away through an adjustable tar-outlet. The water remains inwards underneath the ring, whence it is also led away through an outlet.

The interior of the drum above and underneath the ring forms communicating chambers, in which the two columns of liquid must therefore be in equilibrium. Consequently, if the tar is heavy, the tar-outlet must be adjusted more towards the surface of the drum away from the centre, while with lighter tar, such as carburetted water-gas tar (having a specific gravity of 1·04), the outlet must be set more towards the centre. For the experiments with this type of centrifugal machine, the tar was also preheated to a temperature of 70° to 80° C. The machine ran at a speed of about 2400 revolutions per minute.

As soon as tar flowed from the tar-outlet, a sample was taken. This was examined, and found to contain no water. But, again, in this case we were disappointed by the fact that after a while the percentage of water in the tar became about equal to that of the original tar, and only a little water flowed out of the water-outlet. We found this to be caused by the tar-outlet having been set nearer the surface of the drum than was required in view of the low specific gravity of the tar. Consequently the water could not arrive near enough to the centre of the apparatus. It accumulated without flowing out, and finally left the machine, together with the tar, through the tar-outlet.

Our next step, therefore, consisted in altering the adjustment of the tar-outlet; and as a result tar free of water was at once obtained. But the outflowing water was black, and contained some emulsion—consisting of suds, solid material, and 85 per cent. of water. This water cannot be run off directly to the sewer. It is, however, easily clarified by passing it again through the centrifugal machine. Filtering can be carried out by running the foul water into the top of a tank containing coke dust. The water flowing out at the bottom is quite clear, and can be led away direct. When the coke dust has become fouled, the upper layer only is renewed, and the foul dust, which at these works is burned under the boilers, has gained in heating value.

The experiments have proved that the foul liquid can be purified, by treating it in centrifugal apparatus; the final products being clear water, carburetted water-gas tar free of water, and a deposit of solid impurities in the machine. It may therefore be asserted that the problem of carburetted water-gas tar can be solved completely by the use of the centrifugal machine, and that it is possible to separate a mixture of all the tar produced at the various points of a carburetted water-gas plant into tar containing no water, clear water, and a small proportion of a thick, clayey, black mass, which, like the residue obtained in the treatment of coal tar in centrifugal apparatus, can be distilled in ordinary gas-retorts and (like it) leaves coke behind in the retorts.

By a very careful adjustment of the tar and water outlets (which, owing to the slight difference between the specific gravity of the tar and that of water, is a very delicate operation), we have now also succeeded in obtaining by a single operation—that is, by passing the liquid only once through the centrifugal machine—a direct separation into clear water, which can be run into the sewer without further treatment, tar containing no water, and solid residue. The emulsion, which otherwise causes so much trouble and inconvenience, is consequently completely decomposed by this method into elements present in one of the three above-mentioned products. No further removal of foul liquids is necessary.

One important advantage of the centrifugal treatment is that any solid particles present in the tar are thrown against the surface of the drum, and thereby converted into a practically solid mass. The treatment can be continued until this layer of solid material becomes so thick that it obstructs the annular opening between the ring and the drum. The machine must then be stopped and cleaned. The time during which the machine can be run before cleaning becomes necessary depends, of course, upon the nature of the tar. Until now, this time has varied from half a working day to a full day.

I will now give some figures showing the results obtained with the first experiments. The heated tar was treated in the centrifugal machine for one whole day during ordinary working; and the percentage of water it contained was determined every quarter of an hour. During one hour the quantities of water and tar obtained were determined every quarter of an hour, with the following results:

TABLE I.

Time.	Temperature of the Tar. Deg.	Tar. Kilos.	Water. Kilos.	Percentage of Water.
11.15	69	—	—	—
11.30	72	24	4·5	0·50
11.45	75	24	5·0	0·25
12	78	24	5·0	—
12.15	80	21	4·5	—
1 hour	75	93	19·0	0·2

TABLE II.

Time.	Temperature of the Tar. Deg.	Tar. Kilos.	Water. Kilos.	Percentage of Water.
3.30	74	—	—	—
4.45	81	56·5	9·5	0·25
4	81	44·0	5·0	—
4.15	78	46·0	8·0	—
4.30	78	48·5	11·5	—
1 hour	78	195·0	34·0	0·06

The weight of the residue proved that it constituted 2·6 per cent. of the total quantity of raw tar submitted to centrifugal treatment. Originally the tar contained 17 per cent. of water, which was practically completely removed. About 115 kilos. of tar were treated the first day, and about 245 kilos. during the second day, with perfectly satisfactory results. The quantity of tar treated now amounts to 330 kilos. per hour, without the percentage of water (which is determined every quarter of an hour) varying greatly from the above-mentioned figures. The carburetted water-gas tar is now dealt with regularly by this centrifugal method; and over 2000 kilos. of tar of good quality thus treated are produced daily.

Down to the present time we have worked with fairly high temperatures, in order to facilitate the separation. Very likely, however, it will be possible to get along with a lower temperature, which would, of course, be more economical, though it is not expensive to use exhaust steam. At the same time, if heating increases the capacity of the centrifugal machine, this will be more advantageous. The point will have to be decided by further experimenting.

The reasons for the failure of the earlier attempts made elsewhere in this direction are probably difficult adjustment, owing to the slight difference in the specific gravities of the liquids to be separated, and the question of temperature. It may be stated conclusively that these experiments have proved that, by means of centrifugal treatment, it is possible to separate raw carburetted water-gas tar into tar free of water, clear water, and a compact, nearly solid, pitch-like matter, without any emulsion remaining. As, to our knowledge, the treatment here outlined is nowhere else applied successfully, we thought it well to bring so neat and cheap a method of purifying and removing all water from carburetted water-gas tar to the notice of readers of the "JOURNAL."

Encouraged by this success, we have tried to solve another problem by centrifugal force—namely, ridding the coal tar of its free carbon. We have made a mixture of coal tar and carburetted water-gas tar, and have already succeeded in diminishing the content of free carbon to one-third of the original percentage. Though we have not yet fully succeeded, we think our first experiments in this way rather encouraging, so that we expect shortly to be able to publish more about the matter.

It would, of course, be of great interest to deliver a coal tar free, or nearly so, from free carbon by the aid of carburetted water-gas tar, so that the whole bulk of both kinds of tar may be delivered either for distillation purposes or for use as a liquid fuel for engines.

COLOUR OF ARTIFICIAL ILLUMINANTS.

At the Regent Street Polytechnic last Thursday, Mr. J. S. Dow gave the fourth of his series of lectures on illumination; the subject on this occasion being the "Colour of Artificial Illuminants."

Some preliminary remarks were made on the nature of radiation. It was explained how, as a solid body was heated-up, a mixture of vibrations of differing frequencies was obtained. At first, no frequencies rapid enough to produce light were present; but as the temperature was increased, the slowest vibrations (the red) became apparent, and eventually the colour changed from red to yellow, and then to white, as the other end of the spectrum appeared. Incandescent solids were thus subjected to a "forced vibration," and gave a continuous spectrum. The colour of the light was less blue and more red than daylight in most cases, because the temperature was far below that of the sun. Mr. Dow then proceeded to show slides illustrating the distribution of energy in the spectrum of some artificial illuminants—pointing out that the luminous efficiency in most cases fell below 5 per cent. Probably the most efficient source in existence did not give more than 4 to 5 candle power per watt; but it had been estimated that if we could only find a source which would give all the colours within the visible spectrum, and these vibrations only, as much as 25-candle power per watt might be possible. In order to show colours the same as by daylight, it was essential that all the colours of the spectrum should be present, and in the correct proportions. If, however, we were willing to disregard colour, and to aim only at brilliancy, and to produce only the highly luminous yellow-green part of the spectrum, a higher efficiency could naturally be secured, computed by some authorities at about 60-candle power per watt.

In order to illustrate these points, Mr. Dow threw on the screen the spectrum of an electric arc, explaining the use of the spectroscope, and exhibiting several very small and portable instruments of this kind. He also referred to the mercury lamp as an example of a source which gave a "line-spectrum" by luminescence—this kind of spectrum indicating that the free natural vibrations of the gas, instead of the forced vibrations of a solid, were being secured. Such conditions favoured high luminous efficiency, but led to the sacrifice of correct colour revelation. For example, the mercury spectrum contained no red rays, and therefore red objects appeared black by its light.

As a further illustration of the effect of peculiar coloured light on the appearance of coloured objects, Mr. Dow then covered the lantern screen successively by red, green, and blue light, in which various coloured objects were placed to be illuminated. He showed how a red-painted disc appeared almost indistinguishable from white or orange in red light, whereas a similar green disc came out dead-black. By green light, these conditions were reversed. He likewise showed that intermediate colours which seemed widely different from each other by white light might appear almost exactly the same by red or green. Here, in an extreme form, were illustrated, the effects of different artificial illuminants on colour. A reddish source made reds appear bright and blues and greens dark, and tended to distort mixed colours. At this point, he referred to some colour-boxes had from the Holophane Laboratory, in which the effect of various lamps on coloured ribbons was strikingly exhibited.

The lecturer then went on to discuss methods of testing the qualities of illuminants for displaying colour. He explained the spectro-photometer method, showing the results of some tests of this kind on incandescent mantles, the earliest types of which exhibited a marked sslective radiation in the green. This greenish tendency had, he understood, been overcome in the best modern mantles. He then alluded to the researches of Mr. T. E. Ritchie by the photographic, visual, tintometer, and reflecting power methods—showing several slides summarizing his results, and exhibiting the actual series of coloured ribbons on which the experiments were made. [These researches were described by Mr. Ritchie at a recent meeting of the Illuminating Engineering Society and dealt with in the "JOURNAL" for the 23rd ult., p. 215.] According to these tests, exceptionally good resemblance to daylight was said to be secured by indirect arc lighting; and it had also been claimed that the Moore carbon dioxide tube was exceptionally good in this respect.

At this point some colour photographs were shown. It was explained that, although these "natural colour" photos were serviceable for demonstrating roughly the changes in coloured objects caused by artificial illuminants, they were not exact enough for scientific tests.

Another interesting research had been the attempt to make suitable screens for converting the light from tungsten lamps into artificial daylight. Experiments in this direction had been made by Ives and Luckiesh in the United States; and Dr. Kenneth Mees in this country had recently succeeded in making screens of this kind. He was able to exhibit a cabinet in which the illumination effects from this lamp and from an ordinary tungsten lamp were shown side by side. The cabinet was then lighted up, and Mr. Dow showed the audience how greatly delicate shades of colour were distorted by artificial light—various silks and ribbons and specially painted artificial flowers being used for the experiment. In concluding this section of the subject, the lecturer also pointed out the great importance of an illuminant which resembled daylight exactly for dye-works, florists, colour-merchants, drapers, and artists, and alluded to the possibility that picture galleries might be more frequently illuminated with artificial light in the future. The most interesting speculation arising from the work of Dr. Mees was how far it would be possible by these special screens to convert the light from incandescent mantles, acetylene, and other illuminants into exact standard daylight. Possibly screens might even be devised converting the light from (say) tungsten lamps into a close resemblance to that of incandescent mantles, &c., so that drapers might have a series of cabinets with all the common illuminants for trying colours.

Mr. Dow then went on to speak of the special uses of coloured light. He pointed out the possibilities of securing specially good detail revelation by using mono-chromatic light. Dr. Ettles had referred to the fact that the eye was unable to focus all parts of the spectrum simultaneously, and was usually unable to get a sharp image of a distant object illuminated by blue or violet light. He himself found that, as a rule, the best result appeared to be obtained by using red light for distant illuminated objects—clocks, notices, &c.—and blue or green rays for very near work (*e.g.*, miscroscope reading).

Another opening for mono-chromatic light was in connection with penetrating power. It was generally believed that light from the red end of the spectrum (rays of great wave length) were best able to pick their way round obstacles. The wireless electro-magnetic waves which could pass solid objects were merely light waves of very great wave-length indeed. Red and yellow light, therefore, might be best for penetrating fogs; and it was interesting to consider how far it was desirable to aim at producing light of this kind for marine searchlights, lighthouses, &c. In comparisons of the penetrating power of various illuminants, many additional circumstances besides the colour of the light—*e.g.*, the size of the source, its distribution of light, height of suspension, &c.—had sometimes not been sufficiently considered in the past.

Mr. Dow then passed on to the uses of coloured light for spectacular purposes, and described a unique installation at Pittsburgh, in which a combination of coloured light and special decorating tints on walls and ceilings was used. The striking thing about this installation was the way in which the decorator and architect had worked hand in hand with the lighting engineer.

Reference was next made to some peculiarities of colour-vision. The lecturer drew the attention of the audience to two large sheets of paper coloured respectively red and blue. With a fairly high illumination, they appeared about equally bright; and the colours were, of course, quite distinct. The lights in the theatre were then switched off one by one, until only a single lamp at the back was left burning. At this very low illumination, the blue appeared as a ghostly white, while the red was dead-black. Such phenomena, he said, naturally interfered to some extent with accurate colour photometry; and it was therefore desirable to work at a moderately high illumination. The lecturer mentioned several practical illustrations of the results of these peculiarities of the eye. Some allusion was also made to the alleged psychological effects of red and blue light (red being regarded as stimulating and exciting, blue as soothing and sedative), and on the influence of coloured light on plants.

In conclusion, several experiments were made illustrating the nature of ultra-violet light. A spectrum was thrown upon the screen; and it was shown that when a piece of fluorescent material was placed beyond the visible violet; this further region became luminous—being either red or green according to the material employed. It was explained that fluorescent substances owed their colour to the transformation of light from one wave-length to another. As an illustration of this, the lantern screen was vividly illuminated with ultra-violet light passing through a piece of Uviol glass. A piece of the rhodamine reflector used with the Cooper-Hewitt lamp appeared a vivid red when viewed by these rays; but a piece of cardboard tinted so as to match the pink colour of this material by white light, appeared dead-black under the ultra-violet. Varieties of glass intended to absorb the ultra-violet but transmit visible light—such as the "Euphos" and "Spectros" varieties—were also exhibited; and it was shown that by white light from the lantern they appeared transparent, but by violet and ultra-violet light they cast a dense shadow. Ordinary blue glass produced the converse effect. Reference was made to the effect of ultra-violet light on the eyes, in causing snow-blindness, sunburn, &c., and to its industrial uses for sterilization, tanning leather, testing the permanency of dyed materials, &c. These applications, Mr. Dow remarked, showed how one learned new uses for a variety of light, when once one had enough of it. Possibly in future we might devise more efficient methods of producing mono-chromatic light in large quantities, and succeed in using it for many purposes unsuspected at present.

We regret to learn that Mr. R. S. Hilton, the Secretary and Manager of the Birmingham Corporation Gas Department, and Mrs. Hilton have lately sustained a severe bereavement by the loss of their eldest son.

Mr. John Durant, who celebrated his 102nd birthday at Weybridge on Friday, was employed as bargeman by the South Metropolitan Gas Company for upwards of forty years. The Company have given him a pension since 1883; and a day or two ago a tailor was sent to measure him for a new suit of clothes, to which was added a gift of underclothing. From an interesting note in the current number of the Company's "Co-Partnership Journal," we learn that Mr. Durant is still in possession of intelligence, good memory, and some amount of vigour.

MANCHESTER DISTRICT JUNIOR ASSOCIATION.

Visit to the Stretford Gas-Works—Discussion on Purification.

By the courtesy of the Directors of the Stretford Gas Company and their Engineer and Manager (Mr. H. Kendrick), the members of the Manchester and District Junior Gas Association were afforded the opportunity last Saturday afternoon of inspecting the Company's works. The party, numbering about sixty, reached Stretford in the early part of the afternoon, and were welcomed by Mr. Kendrick and his Assistant, Mr. J. Bridge, under whose joint guidance the tour of the works was made. Since the visit of the Manchester District Institution of Gas Engineers on Oct. 29, 1910 (a report of which appeared in the "JOURNAL" on the following Tuesday), certain additions have been made to the plant, particulars of which are given below.

The chief alterations that have been made lately have been in connection with the extension of the exhausting and purifying plants. A 40,000 cubic feet per hour exhauster has been replaced by one of 100,000 cubic feet capacity. Then four of the old 20 feet square purifiers have given place to four luteless boxes 26 feet square by 6 ft. 6 in. deep, worked by connectionless valves inside the purifiers, and fitted with hurdle-grids. Each box contains a total depth of 5 feet of oxide; the gas going in at the top in each case, instead of the old plan of entering at the bottom. The purifiers have been fitted with steam-pipes for warming the gas during the cold weather; and there has been passed through them since they were put to work on Sept. 10, 150 million cubic feet of gas. Three were charged with a mixture of new and old oxide, and one with Lux. So far it has not been necessary to empty any box; but three out of the four have had the covers lifted and the oxide on the top broken up and turned over. The average pressures thrown by the four boxes all in service for the past two months has not exceeded 5 inches. When it has suddenly risen to 9 or 10 inches, it has always been due to the oxide hardening on the top surface; and this has been broken up. The purifiers were erected by Messrs. Robert Dempster and Sons, of Elland. The station meter capacity has also been extended by putting down a rotary meter of 80,000 cubic feet per hour capacity. This was tested as correct by Mr. Kendrick at rates varying from 10,000 to 100,000 cubic feet per hour.

There is in contemplation the erection of a complete stoking and coke-handling plant, which will consist of one combined stoker, continuous overhead coal-bunkers, telpher and tracking, and coke-bunkers and screens. Tenders have been received; and the order will be definitely settled within the next few days. The total cost of these last alterations will be somewhere in the neighbourhood of £6000.

The portion of the plant described above came in for a good deal of attention on Saturday, chiefly owing to the fact that later on in the day Mr. Bridge was to open a discussion on the question of purification.

At the conclusion of the inspection, the party assembled in the general offices, where afternoon tea had been provided.

Mr. A. L. HOLTON, the President of the Association, occupied the chair.

Mr. J. MACNICHOLL (Warrington), in proposing a vote of thanks to Mr. Kendrick for having made the visit possible, and also for the hospitality which had been extended to the members of the Association, said he was certain all who had taken part in the inspection of the works and plant must have been impressed by the thorough manner in which operations were carried on. The visit had been made the more interesting, because of the way in which Mr. Kendrick and Mr. Bridge had acted as guides to the party—explaining for their benefit the different points of interest. It was by this means that the Juniors gained knowledge which was of the greatest advantage to them in the work they were called upon to perform, and which fitted them for positions they might have to fill later on.

Mr. F. DEAN (Altrincham) seconded the resolution, and in the course of his remarks said the members had had that day another evidence of the practical interest which Mr. Kendrick took in the Junior Association, and his desire to help forward its work.

Mr. HOLTON, in putting the resolution, endorsed the remarks of the last speaker; adding that Mr. Kendrick had all along shown himself a staunch friend of the Juniors.

Acknowledging the compliment paid him, Mr. KENDRICK, who was greeted with hearty applause, said it had been a pleasure to him to show the members of the Association round the works, and the pleasure was enhanced by the knowledge that, in arranging the visit, he had the full consent of his Chairman and the Directors of the Company. Proceeding, Mr. Kendrick contrasted the advantages that gas engineering students enjoy to-day with those available when he was a young man. Many a time in his earlier days had he longed for the opportunities which were now open to those who were entering the profession; and, in a homely way, he advised the Juniors to avail themselves as much as possible of the facilities now at their disposal for acquiring knowledge, as by so doing they would be the better able to deal with the problems arising in the industry in which they were engaged, and in the advancement of which they were all so deeply interested. Referring to the Manchester University Lectures, Mr. Kendrick said it was matter for gratification to see they were so well attended, by both Seniors and Juniors, and he was convinced that the money required for the lectures had been well spent to the advantage of members of both Associations.

THE PROBLEM OF PURIFICATION.

Subsequently the members adjourned to the Gorse Hill Hotel, where a business meeting was held. The PRESIDENT occupied the chair, and was supported by Mr. Kendrick, Mr. D. V. Hollingworth, F.C.S., the President-Elect, Mr. J. Alsop, the Hon. Secretary, and most of the members of the Council.

After a few preliminaries had been settled,

The PRESIDENT announced that Mr. Bridge would open a discussion on

PURIFICATION.

Mr. BRIDGE then made the following remarks:

I shall confine my remarks to the purification of coal gas by means of oxide of iron and Lux material, although the process of purification commences immediately the crude gas leaves the retorts. The method and temperature of carbonization plays an important part, and determines to a very large extent the amount of purification required. The time of carbonization and weight of charge used also plays an important part. When working on eight-hour and 7½ cwt. charges, the amount of sulphuretted hydrogen was found to be 20 per cent. less than when carbonizing 7 cwt. of coal in six hours. No doubt some of our members will tell us of the advantage gained by carbonizing coal in vertical retorts, and how the sulphur compounds are reduced.

The amount of carbonic acid in the gas at Stretford is about 1·6 to 2·4 per cent., and no methods are employed to reduce this, as the cost of purification would be considerably increased without reaping much benefit, and, again, the reduction in luminosity caused by carbonic acid is not so great when using an incandescent burner as it is when flat-flame burners are employed. One per cent. of carbonic acid reduces the illuminating power by 6 per cent.; but the reduction in the calorific power is only 2 per cent. When gas containing sulphuretted hydrogen and carbonic acid comes into contact with ammoniacal liquor, two series of salts are formed as in the equations:

$NH_4HO + H_2S = NH_4HS + H_2O$ (ammonium sulphydrate).

$2NH_4HO + H_2S = (NH_4)_2S + 2H_2O$ (ammonium sulphide).

$NH_4HO + H_2CO_3 = (NH_4HCO_3 + H_2O$ (ammonium bicarbonate).

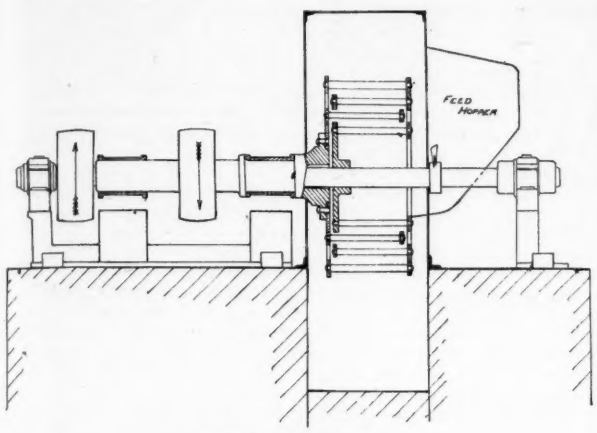
$2NH_4HO + H_2CO_3 = (NH_4)_2CO_3 + 2H_2O$ (ammonium monocarbonate).

Carbonic acid, being a stronger acid than sulphuretted hydrogen, decomposes the ammonium sulphydrate, and sulphide and sulphuretted hydrogen is driven forward. Thus, in working scrubbers, it is better to work them in series than in parallel, as this allows a certain amount of carbonic acid to be taken up by the ammoniacal liquor, and the sulphuretted hydrogen driven forward is easily dealt with in the purifiers.

All the purifiers at Stretford are filled with Spencer's hurdle grids. The hurdles are placed on a tier of ordinary flat grids, about 12 inches from the bottom of the box. The advantages to be obtained by the use of hurdle grids are that the material is held more loosely in the boxes, thus giving rise to less back pressure; a greater weight of oxide can be filled into each box (30 per cent.), thus reducing the number of changes; and there is a better sulphiding of the material, due to less short-circuiting.

We have in use a disintegrator. This machine was installed to break up the partially spent material. It consists of a quadruple cage of square iron bars, fitted to plates in pairs, each pair revolving in opposite directions at 500 to 600 revolutions per minute. The material is fed into the centre of the machine, and is driven by centrifugal force to the outside. In passing through the revolving bars, it is broken up into the consistency of coarse or fine sand, according to the speed of the machine. When oxide is discharged from a purifier, a fair proportion of it is in the form of small lumps, about the size of a pea or marble. These lumps have a coating or shell of oxide fully sulphided; but the interior is of oxide in an unsulphided state. By breaking up these small lumps in the disintegrator, all the material is got into a better state for revivification, and also for purification. This afternoon, you will have seen in the purifying-house a sample of oxide which has been passed through the disintegrator, and was in a finely-divided state, and also a sample which has been treated in the ordinary way, and contained small lumps of oxide, the interior of which had not been acted upon by the crude gas. You will, no doubt, remember the results placed before us at one of the University lectures last winter, showing the advantage to be gained by using oxide in a finely-divided state. One sample of unpulverized burnt spent oxide after four absorptions of sulphuretted hydrogen contained 37·3 per cent. of sulphur; whereas a similar sample which had been divided into a fine state, after the same number of absorptions, contained 47·1 per cent. of sulphur, or an increase of 27 per cent. Experiments carried out at Stretford since the adoption of this machine corroborate these results; and we expect that the machine will prove a useful addition to our purifying plant.

Some two years ago, we purchased a parcel of Lux purifying material. This is a bye-product in the manufacture of pure hydrate of alumina from bauxite, which consists almost wholly of alumina and oxide of iron. The bauxite is intimately mixed with sodium carbonate, and the mixture is strongly heated; sodium aluminate and ferric oxide soda being formed. The mass is extracted with water; the ferric oxide soda decomposing into soda



Oxide Disintegrator.

and ferric hydrate. The material in the anhydrous state contains about 80 per cent. of ferric oxide. The Lux material, when received at the works, contained 46½ per cent. of water, and was mixed in the proportion of 3 of Lux to 1 of sawdust before being placed in the boxes. This was done so as to lighten the material. The quantity of gas passed through this box (one of the old purifiers) has been 139 million cubic feet—94 millions when in the first position, 24 millions when in the second position, and 21 millions when in the third position.

The advantages claimed when using Lux are that as the ferric hydrate is separated out in the manufacture in a molecular condition—that is, finely divided—the absorption of sulphuretted hydrogen takes place more vigorously, being very active the first time it is placed in the purifiers. It is also claimed that the material can be worked so as to contain a higher percentage of sulphur than could be obtained with bog ore, and with fewer changes also—thus reducing the purification charges.

In the old set of purifiers the gas enters the box at the bottom, and passes upwards through the material. On examination of the box filled with Lux, it was found that the gas had short-circuited from the inlet to the outlet pipe. This was no doubt due to the high percentage of moisture in the material, when filled into the box, causing it to cake on the flat grids; and the region around the inlet pipe and across to the outlet pipe was freed from a large proportion of its moisture by the stream of gas before it had time to cake. The material taken from this part of the purifier contained 36 per cent. of sulphur, whereas that taken from similar parts of the box where the sulphiding had not taken place to the same degree only contained 28 per cent. This points out the necessity of seeing that the material does not contain more than 10 per cent. of moisture when filled into the purifiers. This box has not been emptied since it was filled with Lux, and was only put out of action when the new boxes started to work.

In the new set of purifiers, the gas enters each box at the top, and passes downwards through the oxide to the outlet. The advantage claimed for this method of purification is that a greater area of material is exposed to the gas than is the case when the gas enters at the bottom and immediately comes into contact with the flat grids. Another and more important advantage is that if any caking takes place at all, it will be on the top of the material. It is then an easy matter, if the oxide begins to cake and cause back-pressure, to shut off the box, lift the lids, have the top layer turned over, broken up, and placed back again, and the purifier put to work. About a month ago, the purifiers were causing 7 to 8 inches back-pressure. One of the boxes was shut off for examination, the lids were lifted, and it was found that the layer of oxide, about 9 inches deep, on the top of the hurdles had caked. This was broken up and turned over, and the purifier put to work again. The back-pressure due to the box was then only ½ inch instead of the 2 inches previous to breaking up. Each box will be treated in the same way when it begins to cause excessive back-pressure. Under the old system of purification, it would have been necessary to empty and refill at least two boxes; whereas all the expense now incurred is the time taken to break-up and turn the top layer of oxide.

Another advantage claimed for downward purification is that, due to the chemical action which takes place in the purifiers, a considerable amount of water or moisture is produced. As this passes downwards into the mass of the oxide, it does not give rise to an excessive accumulation at any one point, and at the same time it keeps the material in a better condition for purifying. Excess moisture is run off by drain-pipes from the centre valve. When the gas enters at the bottom of the purifier, the moisture formed condenses on the flat grids, and causes the oxide to clog up the passages, give excessive back-pressure, and thus the purifier is shut off before fully sulphided.

In the old set of purifiers, live steam was allowed to enter each box with the gas; but we do not appear to have reaped much advantage, as the boxes have had to be put off before they were thoroughly sulphided, due to the excessive back-pressure which they gave. In the new set of purifiers, live steam is not allowed to enter the boxes; but there is a steam-pipe passing round the interior of the boxes which keeps the oxide warm, and at the necessary temperature for economical purification. The temperature of the purifying material plays an important part. If the material is cold, the action goes on in a sluggish manner; but if the material is kept at a temperature of about 80° Fahr., the action is helped to a very large extent. Thus in cold weather it is a decided advantage to have some means of economically maintaining the purifying material at a suitable temperature. It is proposed to lay a supply of live steam, for experimental purposes, to each of these boxes besides the coil, so that the oxide can be kept in a moist condition when working on the reverse system.

No doubt you are all familiar with the reverse-action process of purification. This makes it possible to work the oxide so as to contain nearly 50 per cent. of sulphur before it is emptied from the purifiers. It is quite obvious that with such a system the purification charges are considerably reduced, as there is far less handling of the oxide. The process is carried out by putting a clean box first in the series when the second box commences to pass sulphuretted hydrogen. The old purifiers were worked on the reverse-action process; but as they were connected by one centre-valve, it was only possible to have three boxes working at once. The new set is connected by means of Dempster's connectionless centre-valve (Weck's principle); and it is possible on this set to have all four boxes in action at the same time. This is an advantage in three ways: (1) All the plant can be worked at once, whereas with the old set, 25 per cent. of it is always lying idle. (2) No sulphuretted hydrogen is driven forward when a change in order of working is made, as is the case when only three boxes are working. When only three boxes are working, and a change is made, the second box is put third in the series, then a considerable amount of sulphuretted hydrogen is driven forward into the holders. This amount varies according to the state of the oxide in the purifier; and the time during which it is driven forward extends to as much as two minutes. (3) This advantage I will endeavour to bring before you later.

In the old system of purification, when the second box began to show a foul test, the first box was put off and the rotation was altered so that the second one became first in the series, and a clean box was put on at the end of the series. Now, under the new system, the backward system, when the second box shows to be passing a slight trace of sulphuretted hydrogen, a clean box is put on as first in the series, the box fully sulphided is made second, and what was the second box is now the third. Thus, there is a clean box at the front and also a clean one at the end of the series when working with all four boxes on. The clean box put on first in the series absorbs all the sulphuretted hydrogen from the crude gas for a time, and the gas which passes into the second box, which has already been fouled, is free from sulphuretted hydrogen, but contains a small percentage of oxygen; and the process of revivification proceeds at a rapid rate in this box.

Tests have been made to prove the accuracy of the statement that when oxide is being sulphided it cannot at the same time take up oxygen. The results of the tests have shown that the action of sulphiding proceeds at a much more rapid rate than does revivification by absorbing oxygen from the gas. Gas was passed into a clean box. After a short time of working, it was found that the oxide in this box alone was removing over 50 per cent. of the oxygen present in the crude gas; but when the box began to pass 1 grain of sulphuretted hydrogen per 100 cubic feet, the percentage of oxygen taken up in the box was below 20 grains, and when 30 grains of sulphuretted hydrogen per 100 feet were passing, the oxygen taken up had fallen to less than 1 per cent. The results of the tests I made are contrary to the statement that sulphiding and revivification cannot take place in the same box at the same time; but the results are borne out when we consider that the action of sulphiding proceeds more rapidly than does the conversion back again to oxide. When the box showed a very foul test, the amount of oxygen taken out was very small indeed; and though the apparatus used for the tests could be read to 0·05 per cent., the diminution in volume was so small that it was neglected. But the tests showed that the action of sulphiding and revivification can go on at the same time up to a certain point, and then the action of revivification ceases in the first box, but goes on more vigorously in the second, which has already been sulphided. When the second box shows to be passing sulphuretted hydrogen on testing with a lead acetate paper (which will be discoloured by less than 1 grain of sulphuretted hydrogen per 100 cubic feet), a clean box is put on first in the series, and the action of revivification goes on in the second and third boxes; and before it is necessary to make No. 3 the first box, No. 2 box has been completely revivified. Thus there are always two clean boxes in the series at each change. This is the third advantage claimed by the working of all four boxes at once.

The change in order of working with the old set of purifiers was made every day; but latterly it was not made until the second box showed to be passing sulphuretted hydrogen. Both systems have commendable features. In our old purifiers, where the gas is purified upwards, the results obtained were better when the change was made every 24 hours. I think this is due to the fact that the water formed in the reaction which takes place in the purifiers is more evenly distributed among the oxide in all the four boxes; whereas when the change is made at longer intervals the greater portion of the water is driven forward into the second box, and wets the oxide to an extent which interferes with its efficiency, and also causes it to clog and give back-pressure.

We had a box of oxide which was very sluggish in its action. A sample was taken and sprayed with weak liquor, and then tested in an experimental purifier. It was found that the efficiency had been increased over 100 per cent. The small amount of ammonia which escapes from the scrubbers should keep the oxide in an alkaline state fit for active purification, and will give better results than when the oxide is sprayed with weak liquor. By allowing ammonia to enter the purifiers or spraying the oxide with weak liquor, the oxide is made more active; but when traces of cyanogen and ammonia enter the purifiers, ammonium ferrocyanide and ammonium ferrous ferrocyanide is formed, which on oxidization forms prussian blue. This reduces the activity of the oxide, and also prevents the subsequent revivification. Though the amount of ammonium ferrocyanide formed is but small, yet the effect on the oxide is far more than the reaction warrants. A short time ago, it was necessary to bye-pass one of the tower scrubbers; and gas containing a fair amount of ammonia passed into the purifiers. After a short while, this box began to cause considerable back-pressure; and on examination, it was found that the oxide was well charged with ammonia and had caked far more than had the oxide in the other boxes. This would possibly be due to the formation of ammonium ferrocyanide and ammonium ferrous ferrocyanide. Several samples of oxide have been taken from the boxes at different depths and tested for sulphur and ammonia.

In all the samples it was found that, as the percentage of sulphur increased, the percentage of ammonia present also increased; but as sufficient samples have not been available, I would not like to say that there is any relationship. No doubt some of our members will be able to tell us this. A sample was taken of the oxide at the top of the box, then 1 ft., 2 ft., and 3 ft. 6 in. from the top. The results of the tests were:—

		Oxide from Another Purifier.	
Sulphur. Per Cent.	Ammonia. Per Cent.	Sulphur. Per Cent.	Ammonia. Per Cent.
30 ..	0·9 ..	17 ..	0·5
37 ..	1·3 ..	30 ..	1·0
44 ..	1·4 ..	37 ..	1·1
48 ..	1·8 ..	38 ..	1·4

From the outlet of each box a pipe is laid, and all are connected to one common pipe which communicates with a pressure-gauge. A short time ago one of the pipes got blocked up, and by testing on the fixed gauge the box appeared to be throwing 4 inches of back-pressure, whereas when testing the pressures at the top of each box with a portable pressure-gauge the back-pressure was only ½ inch. This points to the importance of having the pipes clear; and when a box appears to be throwing too high a back-pressure, it is advisable to test the boxes with a portable gauge, and check the results obtained with the fixed gauge.

With the new type of centre-valves, it is as well to test them periodically, and see if they are in working order and not fast. Otherwise when it is required to make a change, it might be found that the valves are very difficult to turn. We experienced a difficulty of this description at Stretford; and it took four men to make the change, instead of one.

By a well-known rule, the purifiers should each have a superficial area of 840 square feet; whereas the area is 702 square feet. Yet the purifying results and the charges are satisfactory. This is no doubt due to the use of hurdle grids, a greater depth of oxide, and also to the reverse-action process. In comparing figures of gas passed through purifiers before a box has to be changed, it is necessary to know the material employed for purification and its condition, and also the rate of travel of the gas through the boxes and the time-contact. Unless the two latter are known, the figures are not very useful.

The rate of travel of gas through the purifiers has a great effect on the back-pressure caused by the purifiers. During the summer months, the rate of travel will be ½ foot per minute, and the back-pressure 3-10ths to 4-10ths for each box. But during the winter months, when the rate of travel has increased to 1·3 feet per minute, the back-pressure has also increased up to 10-10ths for each box. Thus we see the advisability of having the rate of travel as low as possible, considering back-pressure alone; and when the rate of travel is low, there is better purification of the gas. With larger boxes, the rate of flow would be less, and the purification more satisfactory; but then the capital outlay has to be considered, for which, of course, I am not responsible.

Mr. C. E. Woodhead followed with a short address dealing mainly with the result of experiments he had carried out with purifiers at the works where he is engaged. He did not take the same line as Mr. Bridge, because, as he put it, his experiments had been made on the "old lines." He, however, said he could bear out Mr. Bridge when he stated that the temperature of the oxide in the boxes had a great deal to do with the efficiency of the purification.

Mr. W. Hill (Stalybridge), having complimented Mr. Bridge upon the way in which he had handled his subject, said the result of some tests he had made with bog ore, "Lux" material, and artificial oxide might be of some interest to the members. Taking "Lux" material first, he tried a sample of 40 tons. He put in the sample on Sept. 14, 1909, and at March, 1910, he examined it to find that it had taken up 37 per cent. of sulphur. It was set to work again on June 2, and continued till Nov. 11, by which time it had taken up 49·3 per cent. of sulphur. He wished to add that he could have worked it longer, but he had a special reason for taking the covers off. As to artificial oxide, of which he had also 40 tons, this was put in on Oct. 5, 1905, and worked till the 19th of December of that year. In that time it had taken up 19·6 per cent. of sulphur. It was put in again on Jan. 10, 1906, and worked till Sept. 30 the same year, when he found that it had taken up 51·2 per cent. of sulphur. He had a similar quantity of bog ore, and it was put in on Oct. 26, 1907, and worked till the 30th of November of the same year. The quantity of sulphur taken up was 17 per cent.; and on being put down again on the 14th of December, and worked till Jan. 13, 1908, it had taken up 24 per cent.—a further working from Jan. 30 to Aug. 14, 1908, showed that it had taken up 51 per cent. of sulphur. As to the temperature of the oxide, it was taken nearly every day, and was found to be about 20° above the inlet temperature.

Mr. J. W. Thornley (Salford), speaking as one connected with the distribution side of a gas undertaking, asked whether the liming of coal did not have the effect of reducing the sulphur compounds in the gas. He instanced the case of an office in which he was, where the sulphur dioxide given off was very objectionable; and he expressed the opinion that it would be in the best interests of the gas industry if they could reduce the sulphur compounds. According to some tests which had been made, he believed by coal liming these compounds had been reduced from about 40 to 25·5 per cent.; and he had an idea that even better results had been obtained since those tests were published.

Mr. W. L. Heald (Preston), arguing from a monetary point of view, said that, in his opinion, it was not necessary, in the erection of purifiers, to elevate the boxes, which meant additional expense. He suggested that their working could be done in a much cheaper way by putting them on the ground; also that it was not necessary to empty them so often as some speakers made out.

Mr. J. Taylor (Mossley) said he had found it advantageous to adopt what was known as the Blackburn method, having one half of the gas passing upwards in the purifier and the other half down. The reduction of back-pressure from the alterations he had made with his three sets of purifiers had been very great; and he had been able to get more out of the boxes. As to the point raised by Mr. Thornley about noxious fumes, he had found from experience that most of the complaints arose from imperfect combustion of the gas, probably due to the bad condition of the burners. It was also due in no small measure to insufficient pressure—a fruitful cause of complaint; and likewise to the style of burner used.

Mr. J. Davies (Oswaldtwistle) giving the results of the use of "Lux" material, said they had had some difficulty in keeping it from firing; and on one occasion, when emptying a box, a fire broke out, and the hose-pipe had to be brought into use. At the same time, they had found "Lux" of great assistance in keeping their gas clear; and they had been able to work it for twelve months without a change.

The President pointed out that ammonia in the oxide was a great nuisance to the acid manufacturers, and said its presence ought to be avoided as much as possible in the spent oxide.

Mr. Kendrick, at the invitation of the President, offered some remarks on a few of the points raised. Replying particularly to Mr. Heald, he explained that the cost of the purifiers at Stretford was very small, as they had the superstructure there already, and only needed to add two extra girders. He also expressed the opinion that the claims of coal liming as a means of reducing the sulphur compounds were worthy of the earnest consideration of the members; and he mentioned that the Cheltenham process of mixing flour of lime with the coal had been found to make no appreciable difference to the quality of the coke produced. He hinted that the complaint which had been mentioned by Mr. Thornley, as to the fumes from the gas, was probably attributable to lack of proper ventilation. In conclusion, he said he had been pleased to be with the Juniors, and to have had the pleasure of showing them over his works.

On the motion of Mr. Buckley, seconded by Mr. Battersby, a vote of thanks was passed to Mr. Bridge for having opened the discussion.

Mr. Bridge, in reply, said the question of purification was one of great importance to the gas industry; and there were connected with it many problems which had yet to be solved.

This concluded the proceedings.

The current number of the "City of Birmingham Gas Department Magazine" opens with the commencement of an article on "The Growth of the Birmingham Gas Undertaking;" the story being taken down to 1875, the year of the birth of the department. The description of the Saltley Gas-Works by "F. J. B." is concluded; and "R. J. R." continues his interesting article on the "Evolution of Lighting." The instalment given opens with a remark made by Boswell to Johnson, in 1763, on the brilliant lighting of Fleet Street, in which thoroughfare they happened to meet. Johnson's reply was that it might appear so to Scotch eyes; but that he had sometimes speculated "whether our remoter posterity may not devise some bolder and brighter lamp than these miserable oil-lamps." The writer of the article says: "To those who have seen the present effective high-pressure gas illumination in Fleet Street, there can be no doubt that the 'remoter posterity' to whom Johnson referred have, during recent years, brought science and ingenuity to bear in the evolution of a 'bolder and brighter lamp;' and to-day the illumination of this busy London thoroughfare will bear comparison with the principal streets in any city of the world."

AUBURTIN'S VERTICAL CHAMBER RETORTS.

A patent has been taken out for France by M. Jacques-Emile Auburtin for an arrangement of vertical chamber retorts for the carbonization of coal. The retorts are charged above from trucks, and discharged simply by gravity. This setting differs from an ordinary one of vertical retorts, inasmuch as larger quantities of coal are dealt with, and they are under carbonization for a much greater length of time.

The following illustrations show a setting of four chambers. Fig. 1 is a half view, in elevation, of the retort, and a half transverse section on the line X of fig. 3. Fig. 2 is a longitudinal section along the axis of fig. 5, which is a horizontal section of the setting, showing the heating flues and the generator. Fig. 3 is a similar section on the line Y of that figure. Fig. 4 is a transverse section of the chambers. Fig. 6 is a partial vertical section in the space between two of the chambers.

The chambers are made of refractory material in sections, as shown at A (fig. 6), fitted together so as to form an impermeable receptacle quite independent of the setting. They are braced together by ties B, which are jointed to them so as to preserve the shape of the retorts; and they also support the horizontal slabs C constituting the heating flues. As will be seen from fig. 4, the retorts are slightly cone-shaped, to facilitate the fall of the coke.

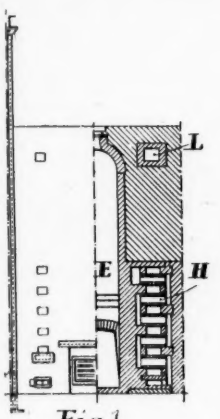


Fig. 1.

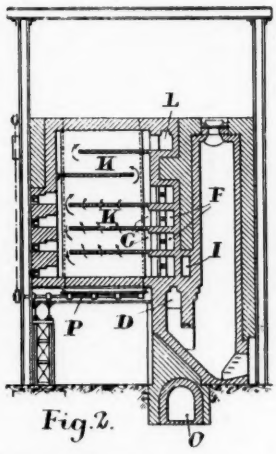


Fig. 2.

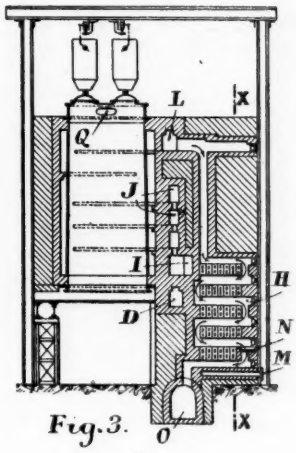


Fig. 3.

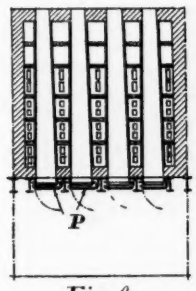


Fig. 4.

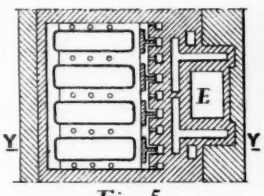


Fig. 5.

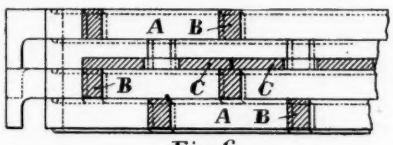


Fig. 6.

The heating of the material is upwards, as indicated by the arrows. The collector D, into which the gas coming from the generator E passes, may form part of the setting itself or be independent of it. The gas-distributing channels F convey fuel gas to the nostrils G. The hot air from the regenerator H is collected by the channel I; and the channels J supply it to the nostrils. The heating flues K convey the products of combustion to the shaft L, and thence to the regenerator. The air inlet M to the latter is regulated by a damper. The smoke damper N is in front of the general collector O, leading to the chimney.

The retorts are charged by the arrangement shown in fig. 3; and the door P prevents the coke from coming out. It is balanced by a counterweight, and is kept closed by mechanism worked from the upper part of the setting. The opening Q is the gas outlet.

ASSOCIATION OF CONSULTING ENGINEERS.

The Institution of Civil Engineers and the Association.

The Secretary of the Institution of Civil Engineers (Dr. J. H. T. Tudsbery) has issued a circular on the subject of the position taken up by the Institution in regard to the recently formed Association of Consulting Engineers. He states that, in view of the numerous inquiries on the matter which have been addressed to members of the Council and to the office, the Council deem it desirable that their views, as expressed in a letter written by their instructions in October last, should be made known to the Institution generally. The letter was at the time treated as confidential to those identified with the proposal to form the Association; but, for the reasons set forth, the Council have directed that a copy of it should be communicated to the members. It is given below.

A. H. Dykes, Esq., 1, Victoria Street, S.W.

Dear Sir,—Referring to the communications received from you on behalf of the proposed Association of Consulting Engineers, and to the views expressed by members of the deputation which was received by the Council, I am desired to say that the Council have considered very carefully the proposals of the Association and the representations submitted by the deputation. The Council are in cordial sympathy with the objects of the deputation in so far as they are directed to the maintenance of a high professional tone among engineers, and to the prevention of abuses which operate to the disadvantage of engineers occupied in private practice.

The definition of a "consulting engineer" obviously presents no small difficulty; and apparently no complete conditions have been laid down, the fulfilment of which would entitle an individual to claim the distinctive title of "Consulting Engineer" which members of the Association propose to adopt.

The Council hold the view that no body or organization can be in a position to give a better and more satisfactory professional qualification than the Institution itself; and it is obvious that, when possessed of such a qualification, any member of the Institution who duly adheres to its rules of professional conduct should be able to exercise freely any professional engineering functions.

The Council also observe that the proposals of the Association involve the omission from the category of consulting engineers of persons who occupy at the time official positions, though they may be at the same time frequently called upon to act in a consultative capacity in engineering matters of no less importance than those dealt with by engineers who do not hold such posts. It is thought that any step tending to exclude from advisory and consultative work engineers who hold official positions in the various branches of the profession, and whose experience may specially qualify them to give advice on matters with which they are conversant, would be an injustice to them, and a serious loss to the public interest.

The Council feel obliged to express the view that, under the conditions put before them, it would be undesirable for the Institution to lend its official support to the proposal organization.

Oct. 28, 1911. (Signed) J. H. T. Tudsbery, Secretary.

Midland Association of Gas Engineers and Managers.—The annual general meeting of this Association will be held at the Grand Hotel, Birmingham, on Thursday, the 29th inst.

London and Southern District Junior Gas Association.—Next Saturday afternoon the members of the Association will visit the Kensal Green Station of the Gaslight and Coke Company, where they will be able to inspect, among other things, the Woodall-Duckham vertical retort installation. Then on Friday, the 23rd inst., Mr. W. R. Herring, M.Inst.C.E., will address the members (at the Westminster Technical Institute) on "The Importance of Detail—Constructional and Otherwise." The address will be illustrated by some lantern slides and models.

Straightening Chimney-Shafts.—Two chimney-shafts, 120 feet high, built in 1859 at the pumping-station of the Louisville Water-Works, near the Ohio River, inclined to a dangerous extent during construction, and were afterwards strengthened by work on the foundations. Owing to the softness of the soil, both chimneys began to settle long before completion, and then inclined, one towards the east and the other towards the south-west—the overhang being about 3 feet in one case and 4 ft. 8 in. in the other. To remedy the defect, a trench 4 feet wide and 21 feet deep was dug along the foundations opposite the sunk side, and vertical pits 18 in. by 9 in. and 6 feet deep were sunk 6 feet below the bottom of the trench, spaced 30 inches apart. Almost as soon as the pits had been completed, one of the chimneys began to straighten; and after 91 days the top was only 3 inches from the vertical. The ground was then filled in, and in a few days the shaft became perfectly straight. The other chimney was more troublesome, and had to be straightened by using screw-jacks, in conjunction with artificial means of causing the soil to yield in the required direction. The chimney was eventually brought vertical, though 213 days were occupied in the process. The weight of each shaft is given as 800 tons, and the foundation pressure at about 2 tons per square foot.

FOUNDATIONS FOR A LARGE GASHOLDER.

In previous issues of the "JOURNAL," reference has been made to the large gasholder, of 10 million cubic feet capacity, which the Consolidated Gas Company of New York have erected on the banks of the Harlem River, in the borough of the Bronx. It has five lifts, rises to a height of 233 ft. 2 in., and works in a steel tank 251 ft. 3 in. diameter and 46 ft. 4 in. deep. An account of the lowering of the bottom of the tank—taken from "Engineering Record"—was given in the "JOURNAL" about a year ago; and the following additional particulars in regard to the structure are extracted from the same publication.

It was at first intended to erect the gasholder at Kingsbridge; but the exploration of the site proposed there showed that the rock was too deep to be reached by the foundations; and the possibility of transverse movement of the earth towards the adjacent railroad track involved the danger of distortion in the great tank which might enormously increase the stresses and disturb the equilibrium, thus possibly threatening its safety. The location was therefore changed to the present site, which was a marsh. The surface of the ground, though varying from about 5 to 15 feet above mean low tide, was always wet, and springs abounded.

The original design provided for a circular horizontal reinforced concrete platform, 4 feet thick, 250 ft. 3 in. in diameter, supported on the ground and on an annular foundation wall 248 ft. 3 in. inside diameter, with a uniform thickness of 5 feet from top to bottom. It was supposed that the surface of the rock sloped uniformly towards the river at an angle of about 30°; thus requiring a height of about 18 feet of wall for the shore side of the tank, and about 45 feet for the river side.

It was intended to make the low portion of the wall without reinforcement, and to brace the high part with exterior buttresses 5 feet thick, 25 feet apart, battered about 1 : 4 on the outer face of it. Eventually these were omitted, and the wall was built with a uniform thickness of 5 feet for a distance of 18 feet below the top, and where the footings were much deeper than this elevation the thickness of the wall was doubled—leaving an external horizontal offset 5 ft. 7 in. wide at about the elevation of the highest rock surface.

Before the construction was commenced, a test pit, 10 feet square, was sunk to a depth of 45 feet below the surface on the river side of the gasholder, and passed through about 40 feet of decomposed gneiss, which was at first hard, but became very soft after a few hours' exposure to atmospheric action. The test pit was sunk 10 feet farther, in the hope of reaching better material, but without showing any important difference in the rock; and it was then determined to accept it for the footings of the foundations, and to increase them to a width of 10 ft. 7 in. for the deepest portions of the wall.

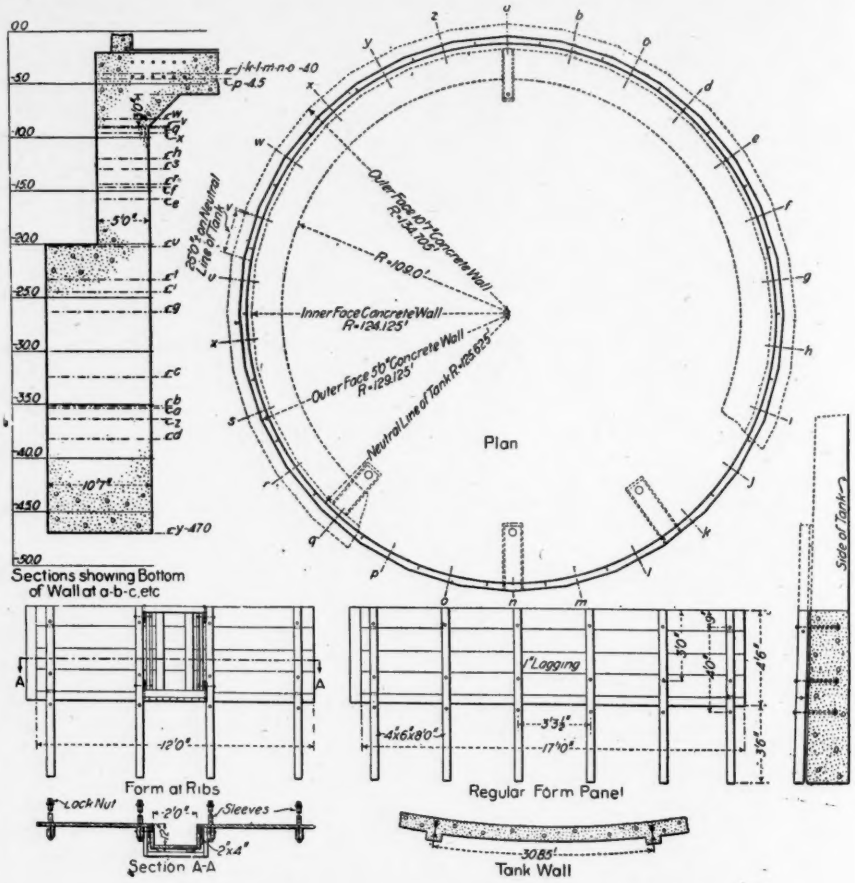
A boring made about 50 feet from the test pit indicated rock at a depth of 9 feet. But it was found, when the trench was excavated, that there was an abrupt drop of 35 feet in the rock surface near this point. The surface of the rock was irregular throughout the entire trench excavation; and the character of the stone varied from hard to very soft and rotten. The maximum foundation pressure does not exceed 10,000 lbs. per square foot.

The bottom of the gasholder tank is from about 7 to 17 feet below the original surface of the ground; and the excavation for the main pit, about 300 feet in diameter on top, with 1 : 1 exterior slope, was commenced by a 3-feet clamshell bucket operated by a stiff-leg derrick. About 5000 cubic yards of earth and mud were handled by the clamshell, which delivered to 15-feet dump cars drawn by a locomotive to a spoil bank just beyond the holder site, where it was wasted to form a fill about 12 feet deep.

After the clamshell bucket had excavated to a depth of 6 or 8 feet, the remainder of the excavation was made by pick and shovel; the spoil being loaded in 3-feet steel buckets handled by eight movable stiff-leg derricks set inside and outside the circular wall. A trench about 22 feet wide was excavated round the circumference of the site, and round the outer edge of it the trench for the foundation wall was excavated to or below the surface of the rock, with a uniform width of about 11 feet. This trench was from 8 to 50 feet deep, and was chiefly excavated in soft, rotten rock that would stand vertically when first excavated, but after a short exposure required sheeting to maintain it. The trench was accordingly lined with some 3-inch tongue-and-groove sheeting, in 23-feet lengths, driven as the excavation progressed by steam-hammer, handled at first by the derrick boom, and afterwards by a breast derrick. When the trench was very deep, the upper part was made wide enough to permit a lower tier of sheeting inside the first tier.

In general, the pressure against the sheeting was not very great; but in one case, where the trench ran for about 100 feet through fine sand, it required heavy bracing. A considerable quantity of water was encountered; and it was drained to a single sump, from which it was removed by a 4-inch steam-pump working continuously. The core was removed by a steam-shovel.

Broken stone and sand for concrete were stored in large heaps on the surface of the ground on the bank above the gasholder, and were delivered as required by the clamshell bucket to storage bins of about 20 cubic yards capacity located on the side of the hill above the mixing platform. A rectangular steel-lined measuring hopper, divided by a vertical transverse partition, was set just below the mixing-floor, and was filled up to gauge marks with broken stone and sand delivered through shoots leading from the storage bin.



Foundations for the Gasholder and Forms for the Outer Wall.

The contents of the hopper were discharged by gravity to the 3-feet mixer, which in turn delivered to steel tilting buckets on flat cars on service tracks of 3 feet gauge laid to all parts of the work. The full cars descended by gravity to the required point, where the buckets were unloaded by derrick booms which emptied their contents and replaced the empty buckets on the cars, which were hauled back to the concrete mixer by a hoisting-engine and wire cable. The stiff-leg derricks were supplemented by a Wilson locomotive crane with a 35-feet boom—thus commanding the entire area of the foundation of the annular trench and of the tank bottom enclosed by it.

The 10-feet wide portion of the circular wall was concreted without forms by filling the entire lower portion of the trench. Afterwards the outside form was set on top of the concrete for the outer face of the 5-feet annular wall. This form consisted of panels about 12 feet long and 5 feet high, made of 1-inch undressed horizontal planks spiked to exterior 6-inch square vertical pieces 3 feet apart. They were braced to the outer face of the trench, and handled by the derrick booms as each successive 4 ft. 6 in. course was built.

The total amount of earth and rock excavated was 32,420 cubic yards, 25,554 yards of which were above the elevation —4. All concrete was made with portland cement; and 7358 yards, proportioned 1 : 3 : 5, were used up to the elevation —2, where the steel base-plate for the tank was set. About 900 yards more of

1:3:5 concrete, made with ¾-inch broken stone, were used above the elevation —2 to form a protection 18 to 24 inches thick and 17 feet high, enclosing the steel tank from the top of the foundation wall to the top of the backfill, and protecting it wherever inaccessible for future painting. This concrete was reinforced and anchored by ¾-inch horizontal circumferential rods, passing through the radial webs of the exterior vertical ribs riveted to the tank and wired together. The rods were supported at the centre points by engaging slots in vertical spacing-bars built into the concrete.

The exterior forms for the concrete were made of wooden panels, about 13 ft. and 18 ft. long and 4 ft. 6 in. high, with 1-inch sheathing lined with iron bolted to 4 in. by 6 in. uprights which projected 3 ft. 6 in. beyond one edge of the form. For the first course of concrete, these forms were set with the cleats projecting above the upper edge; but afterwards they were reversed, and the cleats projected below the lower edge, serving as cantilevers to support them from the concrete already laid. The forms were spaced from the steel tank by temporary wooden blocks, against which, in the first course, they were held tightly by double-wire ties engaging the horizontal reinforcement rods, and twisted very tight, so as to hold the forms rigidly in position.

Temporary horizontal ¾-inch anchor bolts about 26 inches long were built into the concrete about 2 ft. 6 in. apart vertically, and about 3 feet apart horizontally, so as to provide connection in each course for the forms to hold the concrete in the next course. The bolts penetrated the concrete about 16 inches, and were protected from adhesion to it by light sleeves made of cement mortar. The inner ends of the bolts were provided with nuts bearing upon cast-iron anchor washers permanently embedded in the concrete. After the forms were removed, the bolts were unscrewed from their fixed nuts and removed for use again—leaving the holes in the cement sleeves to be filled with mortar after the forms were removed.

Concrete was discharged from the mixer into a 3-feet steel skip on a flat car on a 24-inch track encircling the tank at the level of its bottom. The bucket was blocked up on timber cribbing, forming a sort of tower on the car platform, of a height corresponding to the successive elevations of the top of the form; and the concrete was shovelled directly from the skip into the form—commencing at a given point, and filling the form continuously round the circumference of the tank up to the point of starting. The operation required about four or five days. This allowed the concrete to set at the point of starting before the course was finished, and thus enabled the form to be removed and set for the second course as soon as the first was ready. The extensions for the ribs were made integral with the forms; and the latter were handled quickly and easily by derricks located on the bank outside the tank.

The connections for the holder required the construction of a tunnel from the tank, under six tracks of the New York Central and Hudson River Railroad, to the bank of the river, in which two 30-inch cast-iron mains were laid to connect with the submerged mains.* The river end of the tunnel was protected by a bulkhead coffer dam, and five rows of pipes were driven—one in the axis of the tunnel, one under each side wall, and one just outside each wall. Between the running of trains, the earth was excavated under one track at a time; and the ties were supported on a tier of old rails carried on cribbing from the outer rows of piles. Space was thus provided in which the bottom and side walls of the tunnel were built, and the latter were roofed with transverse 100-lb. rails, in solid double tiers; the upper tier being inverted, so that the heads of the rails fitted between the webs of the lower tier rails. The rails were covered with concrete; the tunnel trench was back-filled; and the track transferred from temporary to permanent support over it.

The work was carried on under the general supervision of the engineering department of the Consolidated Gas Company, of which Mr. W. H. Bradley is the Chief Engineer, and Mr. W. Cullen Morris, the Constructing Engineer. The Bartlett-Hayward Company, of Baltimore, were the Contractors for the steel superstructure; and they were responsible not only for the design of the foundation, but superintended the execution of the work.

* Details of the main-laying work under the river will be found in the "JOURNAL" for Jan. 24, 1911 (p. 221).

RECOVERY OF THE AMMONIA IN GAS.

The ammonia contained in the gases resulting from the distillation of coal is generally recovered in a liquid form, and subsequently treated for the production of sulphate of ammonia. Various attempts have, as is well known, been made to dispense with the intermediate operation of dissolving the ammonia in water, and treat it directly with sulphuric acid while it is still in the gas. One process consists in avoiding all cooling of the gas, and consequently all condensation, removing the tar hot, and conveying the hot gas through a solution of sulphuric acid. This method, however, presents certain inconveniences, to avoid which other inventors first condense the gas as usual, the result being the production of a certain quantity of ammoniacal liquor, which is treated in the ordinary way. But while some convey the vapours from the still to the main current of gas flowing to the saturator, others suggest that they should be introduced into the saturator after having been freed from steam. In the first of these processes, the presence of a large amount of steam in the gas reaching the saturator necessitates keeping the gases at a high temperature to avoid condensation, which would dilute the acid bath. Consequently they must be heated before they enter the saturator. On leaving it, the gas is at a high temperature, and saturated with steam, which decreases its calorific power. In the second process, the apparatus and the cost of heating the gas are dispensed with; but in freeing from water the vapours coming from the still, condensed products containing ammonia are formed. If the vapours are again treated in the still, it is a source of additional expense; and if they are abandoned, the ammonia is lost.

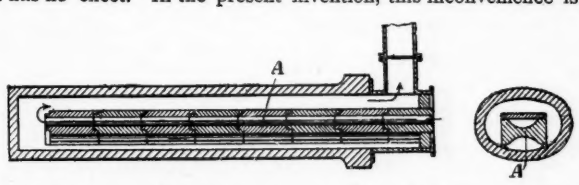
M. Maurice Davicion has taken out a French patent for a process for recovering the ammonia in the form of sulphate. Like the two last processes, it consists in cooling the gas; but the inconveniences above specified are avoided by having separate treatments for the ammonia in the liquor and for that contained in the cooled gas. The gas leaving the condenser at a temperature of about 30° C. (86° Fahr.) contains nearly four-fifths of the total ammonia. After the complete removal of the tar, the gas is brought into contact, in the saturator, with an acid solution containing from 3 to 7 per cent. of free sulphuric acid, and of about 32° Baumé. As the gas leaving the apparatus carries away steam from it, this continuous removal of water and a suitable addition of acid maintain a constant degree of concentration in the bath, and the sulphate of ammonia formed is precipitated in the form of crystals. The gas leaves the saturator relatively cold, and consequently with little steam. It is therefore in the best condition for being conveyed to the furnaces for heating, or purified for use in engines or for lighting.

The sulphates coming from the ammonia in the liquor and from that contained in the cooled gas are separately manufactured. The treatment of the gas with sulphuric acid being effected at a low temperature, there is no fear of reactions to change the composition of the gas and decrease the percentage of benzol. Consequently, it is claimed that this process can be employed in gas-works; and it is interesting to note that it can be applied with the greatest ease in existing plant—all that is needed being to add a saturator in which the sulphate is produced directly from the gas leaving the condensers. These and the still are retained; but as their work is reduced about 75 per cent., they have only to be in action intermittently. Thus the quantity of steam required is considerably reduced. The ammonia washers are either dispensed with or utilized as benzol washers.

FACILITATING COMBUSTION IN GAS-RETORTS.

A patent has been taken out for France by M. Reschotzkowski for an appliance to facilitate combustion in gas-retorts. In his specification, he says:

As is well known, a small portion of the volatile properties escaping from coal during the process of carbonization are decomposed against the incandescent walls of the retort, and gradually cause the formation of a solid coating, which has to be removed from time to time. To do this readily, appliances are used to facilitate combustion; but those hitherto known possess the disadvantage due to the fact that the air introduced comes in contact with the hot floor of the retort, and being heated in this way it has no effect. In the present invention, this inconvenience is



avoided by conveying the air through an insulated passage. This is done by making the transverse section of the retort in the form of a double horizontal T, the cavity of which, turned towards the floor, constitutes the insulating device conjointly with the walls of the apparatus; while the air is led into the other cavity, which is covered with plates.

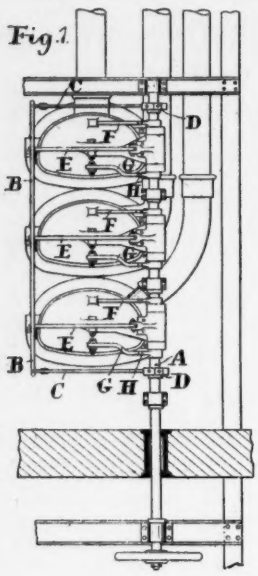
The illustration represents one method of carrying out the invention—a longitudinal section of a retort showing the device, and a transverse section.

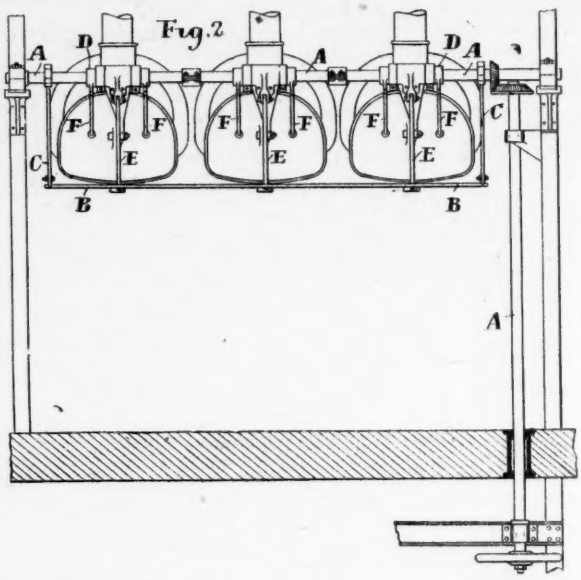
The appliance A, in transverse section, has the form of a double horizontal T, which has points of support for plates which are eventually placed on the cavity of the appliance opposite to the floor of the retort. The vertical pipe is for the escape of the air flowing through the insulated passage after having come in contact with the wall of the retort. The appliance and the plates are preferably made of fire-clay.

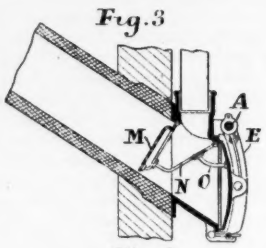
Mr. Francis Taggart, for some years a Director of the Grand Junction Water-Works Company, whose death was announced in the "JOURNAL" for Nov. 28, left estate of the gross value of £160,969, of which the net personalty is £128,472.

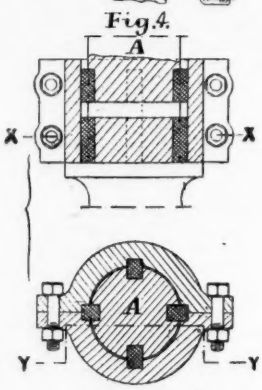
SIMULTANEOUSLY OPENING AND CLOSING THE LIDS OF GAS-RETORTS.

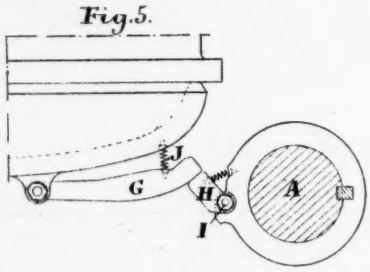
A patent has been taken out for France by M. Henri Breuillé, for a method of opening and closing several gas-retorts simultaneously. The following particulars of the arrangement, by means of which, it is claimed, large quantities of coal can be carbonized with a considerable reduction of manual labour, are translated from the French specification.











The illustrations show different types of the device, which is suitable for horizontal or inclined retorts. Fig. 1 is the front of a setting of horizontal retorts placed vertically, to which the invention has been applied; and fig. 2 shows it adapted to retorts set in line. Fig. 3 is a device for opening and closing the inner lids employed for horizontal or inclined retorts or muffle furnaces. Fig. 4 shows sections on the lines X and Y of the working shaft; and fig. 5 gives details of the mechanism to operate the lids.

The lids of all the mouthpieces in the group are keyed by means of eccentrics on to one shaft A, which the stoker can set in motion by a handwheel, fixed as shown in figs. 1 and 2, or in some other convenient position. By the rotation of this wheel the lids are opened simultaneously. When they are fully open, the rod B, moved by the arms C of two eccentrics D keyed on to the shaft A, liberates the cross-bars E fastening the lids. On these being completely released, the wheel, continuing to revolve, causes the levers F to open the lids to the extent necessary for the removal of the coke. When the drawing operation has been finished, the wheel is turned in the opposite direction, and the levers G close the lids. The catch H (fig. 5), turning on the axis I, is stopped in a position determined by a stud. During rotation, it impinges upon the lever G; and as this is maintained by the spring J, it acts upon the lid, which rotates upon the shaft A until it is stopped by coming in contact with the mouthpiece. The wheel and the shaft continuing to rotate, the catch presses the lever against the spring, and causes it also to rotate. At a given moment, the catch is released; and as the shaft still turns, the catch is drawn back into its original position by the spring. Meanwhile, the collars of the cross-bars E are stopped by the eccentrics D acting on the rod B; and by means of the other mechanism the lid is closed. In the movement for opening the lids, the catch impinges upon the end of the lever G, the spring connecting it with the shaft is compressed, the catch is released, and the lever is liberated.

The arrangement shown in fig. 1 can be applied to open and close the lids of a row of retorts set horizontally. The shaft A is made to rotate by turning the fly-wheel and the vertical shaft connected with it, at the top of which are a pair of toothed wheels, as shown in fig. 2. In this arrangement, the levers G are dispensed with, as the lids close by their own weight. The horizontal portion of the shaft is in sections, to allow free expansion of the mouthpieces without interfering with the working. The sections are joined by sleeves, which permit of the shaft being lengthened even while it is revolving.

The arrangement indicated in fig. 3 is suitable for opening and closing the inner lids of retorts. In the diagram, the inner lid M is shown in position with the mouthpiece closed. It is made of perforated sheet iron, and turns upon an axis fixed in an upper part of the mouthpiece. Near the extremities of the lid are two flanged levers N, joined by a third lever O. On the outer lid being opened, the lid M and the levers N assume a vertical position. When the coke begins to leave the retort, it pushes the inner lid forward, and also the levers N, which disappear into the upper part of the mouthpiece. As soon as all the coke has been discharged, the inner lid and the levers resume their vertical position; and on the outer lid being closed, the lever O acts upon the levers N, and moves them forward. These levers then come into contact with the inner lid, which is pushed back into its original position.

APPARATUS FOR DETERMINING CARBONIC ACID IN AIR OR FLUE-GASES AND FOR SIMILAR PURPOSES.

The name of Arndt is well known in connection with apparatus for the determination of carbonic acid in chimney gases, &c.; and a series of three patents (of which the specifications have recently been published) granted to Max Arndt, of Aachen (Aix-la-Chapelle), are likely to be of interest to readers of the "JOURNAL." The date of application is in all cases Nov. 23, 1910; and the patents are No. 27,253 (1910), and Nos. 18,502 and 25,261 (1911). They refer to several alternative types of "Apparatus for Testing Air or other Gases and Liquids by their Action in Changing the Colour of a Liquid Reagent."

The first of the three patents (No. 27,253 of 1910) shows five constructional forms of apparatus for indicating the presence of certain constituents in a gaseous mixture by means of the change of colour of a liquid reagent, of which there is a store in a container under constant pressure, and of which the portion in use for testing is drawn from the container by means of a thread or band. The container holds a reserve supply of the thread, immersed in the reagent, which is protected from the atmosphere by the container. The container is made much in the form of a Mariotte's bottle, or similar form which admits of the pressure within it being maintained approximately equal to that of the atmosphere by the admission of bubbles of air as the reagent is withdrawn. The exposed portion of thread serves as the testing medium, and a scale may be provided alongside it to facilitate observation of the rate of change of colour of the reagent on the exposed thread, and thereby the approximate quantity of the reacting constituent in the gas or air under examination may be inferred.

One form of the apparatus is shown in fig. 1, in which is the reagent, of which the stock is contained under constant pressure in the container E, and of which a portion is drawn out as required through the medium of the thread A, of which a reserve is inserted in the vessel C, which is closed air-tight. The exposed portion of the thread may have a scale with numbered

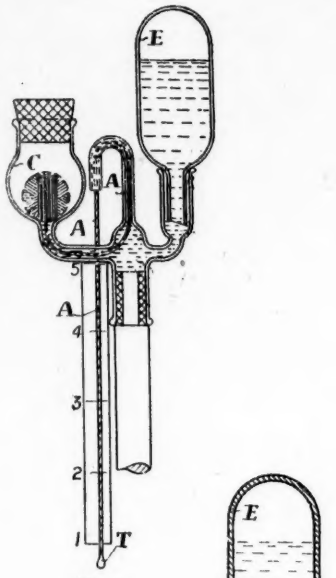


Fig. 1.

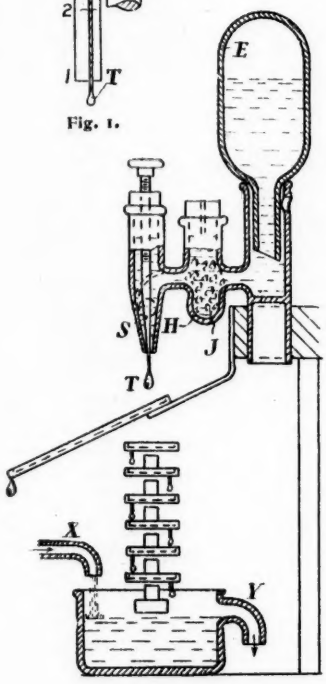


Fig. 3.

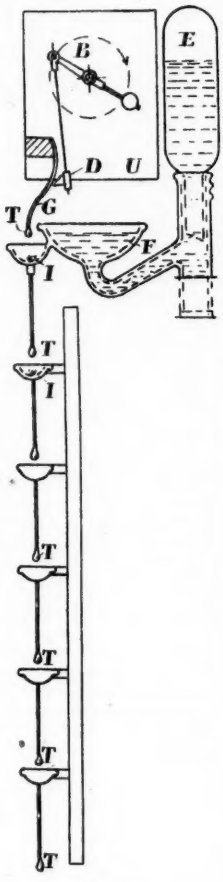


Fig. 2.

divisions (as shown) alongside it, and the reagent drips from the end T of the thread. Four other forms of the apparatus are illustrated in this specification, all having a Mariotte's bottle, or similar device, for maintaining constant the level of the reagent, so that the pressure at which it is drawn off shall be constant.

The second of the three patents (No. 18,502 of 1911) refers to the use of a mechanically actuated scoop for feeding the liquid reagent in approximately equal quantities at regular intervals on to the test-thread, or into cups containing the latter.

Three constructions are illustrated, of which one is reproduced in fig. 2, in which there is shown a shaft operated by clock-work mechanism U, and a crank B on the shaft which, by means of a rod, actuates the scoop D. The scoop is thereby alternately dipped into and raised out of the reagent, which is maintained at a constant level in the container F by means of the Mariotte's bottle E. The scoop D, when raised, carries up a small quantity of the liquid reagent and transfers it to G, from which it passes on to a single piece of test-thread, or into cups I, each with short lengths of test-thread from the ends T of which it drops. The alternative constructions differ in the mechanism used to actuate the scoop, and the mode of transferring the liquid from the latter to the test-thread.

The third patent (No. 25,261 of 1911) refers to the use of a valve, at the outlet of the vessel containing the store of reagent, for the purpose of regulating the rate of flow of the latter to a test-strip. Two forms of valve are shown and described, of which one is illustrated in fig. 3, in which the reagent is maintained at constant level in a vessel by means of the Mariotte's bottle containing a stock of the reagent. A filter-chamber, with a filter J, is provided, in order to retain particles which otherwise might choke the outlet S, which has a valve, by means of which the formation of separate drops T at definite intervals of time is regulated. The separate drops may be conducted on to a test-thread, or a test-surface, or a series of surfaces or cups.

As an illustration of the use to which the apparatus described in these three specifications may be put, it is said that if a solution of soda coloured violet with phenolphthalein is employed as the reagent, the proportion of carbonic acid in the air or gas surrounding the test-thread or test-surface will be indicated by the rapidity with which the violet colouring on the thread or surface disappears. In the case of the last two of the three patents, the test-thread or surface may be dispensed with, and the reagent be allowed to drop directly into the liquid that has to be tested. For instance, an ammoniacal liquid coloured red with phenolphthalein will lose its colour when dilute hydrochloric acid is used as the reagent, and is allowed to drop into it. If the vessel shown at the foot of fig. 3 is used, a liquid passing through from the supply pipe X to the overflow Y may be continuously tested in this way for the control of the working of a technical process.

THE NEW ENGINEER AT EAST GREENWICH.

The Chairman of the South Metropolitan Gas Company (Mr. Charles Carpenter) visited the East Greenwich station on the 2nd ult. for the purpose of introducing Mr. F. J. Bywater, who, as readers may remember, succeeds Mr. Joseph Tysoe as Engineer; and an account of the proceedings is given in the Company's "Co-Partnership Journal" for the current month. Mr. Carpenter pointed out that to take charge of works of the size of those at East Greenwich, which were responsible for about half of the Company's make of gas, the Engineer must have a great many qualities. "He must be a man of sterling character; he must also be a good engineer, and not only that but an able manager of men—a gift not possessed by all. Then, again, he must be endowed with the spirit of co-partnership, and a firm believer in its principles. He believed all these qualities were possessed by Mr. Bywater." Mr. Carpenter then expressed his sorrow in taking leave of Mr. Tysoe, as he felt he was parting with a personal and devoted friend, and the men with a sincere, honest, and faithful chief. Mr. Bywater said he was exceedingly obliged to Mr. Carpenter for his kindness in coming down to East Greenwich and giving him a personal introduction. He appealed to all for loyalty in assisting him to "get on to the rails, and subsequently to carry on the traditions of the works." With regard to co-partnership, he was a firm believer in it from the bottom of his heart. Referring to his predecessor, he said he hoped, now that the strenuous part of Mr. Tysoe's work was over, he would regain better health in his retirement. Mr. Tysoe thanked both the Chairman and Mr. Bywater for their remarks and good wishes. Mr. Newbold, on behalf of the men, promised the new Engineer the support of everyone at East Greenwich. At the request of the Chairman, Mr. W. Doig Gibb, the Chief Engineer, added a few words. He said Mr. Bywater had to prove himself in the same way that he had had to do; but he could assure him that this was not so difficult a task as it first appeared to be, because assistance was rendered everywhere.

The Glover-West System of Vertical Retorts.—We have received from West's Gas Improvement Company, Limited, a handsome volume (modestly called by them a *brochure*) containing particulars and illustrations of the Glover-West system of continuous carbonization in vertical retorts. Readers may remember that in a previous volume the original installation of these retorts at the St. Helens Gas-Works was described, and the results of tests made with it were given. In the present book, the information then furnished is supplemented by the results obtained at the Droylsden station of the Manchester Corporation and with the second, and larger, installation at St. Helens. Views and plans are given of settings of these retorts at the two places just named and others in England and abroad (even at Tokio). Engineers contemplating the introduction of vertical retorts will be interested in the plan on p. 84, showing the ground area required by an installation on the system under notice; and also in the coloured plate, showing a section of a setting, which forms a frontispiece to the book.

Permutite as a Water Softener and Purifier.—This subject has lately been dealt with by Herr A. Kolb in the "Chemiker Zeitung;" and an abstract of his communication appears in the current number of the "Journal of the Society of Chemical Industry." Several references to the substance in question, which has the property of removing certain constituents from water and softening it, will be found in the volume of that publication for 1907. The constitution of permutite is $3SiO_2$, Al_2O_3, $(K_2O.Na_2O.CaO)$, $5H_2O$. Experiments were made, both by shaking and filtration, to ascertain the interchange taking place between permutite and chlorides of calcium, magnesium, and potassium; and it was found that the soda of the permutite was replaced by the bases of the salts added in molecular proportions. The permutite could be regenerated by treating the used substance with common salt. As well as the alkaline earth metals, iron and manganese could be removed similarly from solution. It is stated that with a filter formed of permutite, complete softening of water can be effected. The water must not be acid, and must not contain suspended matter. A muddy water, in addition to blocking the pores of the filter, coats the grains of the filtering material with inert matter, and prevents the chemical reaction taking place. The regeneration of the permutite by a solution of common salt is of industrial importance, as it enables the same filter to be used for an indefinite time.

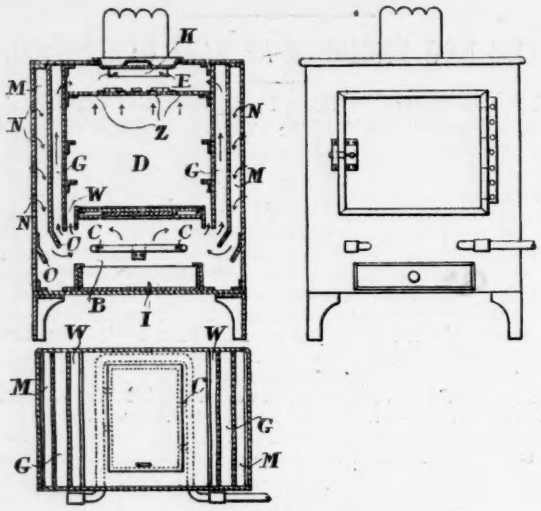
REGISTER OF PATENTS.

Gas-Stoves.

WHITE, W., of South Tottenham.

No. 23,033; Oct. 5, 1910.

This invention relates particularly to gas-stoves intended for cooking purposes, with the object of producing a stove which can be used simultaneously for grilling, baking, and boiling purposes, without necessitating more than one burner or set of burners.



White's Gas-Stove.

As shown, the casing of the stove is divided into three main compartments—a lowermost compartment B, containing a set of burners C, and adapted to act as a grilling chamber; an intermediate compartment D, adapted to act as an oven; and an upper chamber E, adapted to form a flue to receive saucepans and the like. The top of this chamber also forms a hot-plate. Below the burners C, a drawer I is fitted with a grid-iron to facilitate grilling. The hot gases from the burners, after striking the bottom of the oven, are led off to one or more side flues G, by which they are conducted to the upper chamber E, and are utilized to heat utensils placed in holes in the top of the upper chamber. Some of the hot gases are allowed to pass through side openings W into the oven, and thence, by perforations Z in the top of the oven, to the upper chamber. The fumes escape from the upper chamber through a flue K and chimney. The side flues G, which lead hot gases from the lower chamber to the upper one, are preferably separated by vertical partitions from inlet ducts M for air, which is led to the burner chamber. Air is adapted to enter these flues M, through perforations N, in the outer casing of the stove; the air passing down over the heated partitions of the flues and being thereby preheated before reaching the burner. The partitions in the side flues are so arranged as to lead in the air to the lower chamber below the level of the burners—for instance, they have deflecting plates O, to direct the air to the burners. The perforations or air-inlet apertures may be, if desired, controlled by regulators or shutters.

Under ordinary conditions, it is preferred entirely to close the stove except for the air-inlet perforations in the side flues; the chimney being of sufficient length to create the draught required to draw the air into the lower chamber.

Prepayment Meter Mechanism.

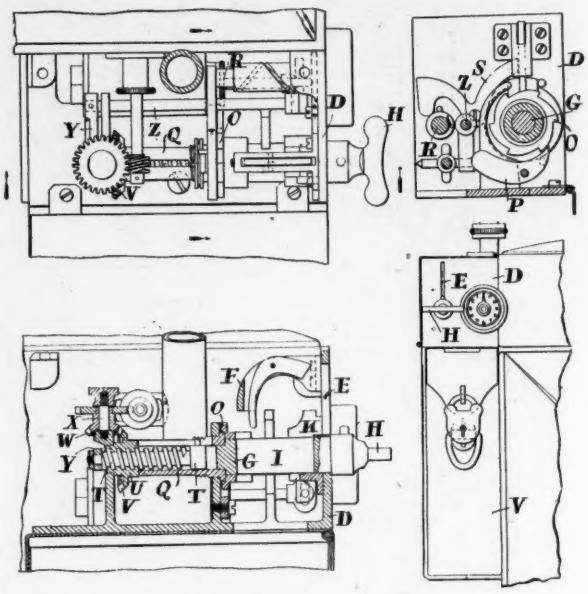
MACKAY, J., and ANDERSON, J., of Edinburgh.

No. 26,278; Nov. 11, 1910.

This invention relates to prepayment mechanism especially of the kind described in patents Nos. 26,369 of 1897, and 7975 of 1903, and particularly to that described in patent No. 14,456 of 1905. In these patents there are described prepayment mechanisms having worm-sleeves and shafts operating intermediate shafts which cause the rotation of indicating shafts. The coins are led to the coin-shaft either through vertical or horizontal slots; and the various parts are carried in (say) three standards mounted in connection with a base-plate. The arrangements have been such, however, that the whole of the prepayment mechanism could not be removed intact from the meter. The object, therefore, of the present invention is "to obtain an improved prepayment mechanism and devices in connection therewith, chiefly with a view to the construction of a mechanism which shall be readily accessible and comparatively cheap to manufacture and maintain in order."

The illustration shows an elevation of the meter mechanism sections looking in the direction of the arrows, and a (part) general view of a meter containing the prepayment mechanism.

The external wall D of the prepayment mechanism has a vertical slot E made in it to receive the coins; and on to it, at the back, is screwed a substantially right-angled guide F carrying a pivoted bar curved to the path which the edge of the coin will take to guide it and prevent fraudulent operation. A standard is also provided to limit the size of the coins which the rod G can carry, and to prevent them falling out during rotation. The wall D also forms one bearing for the rod G constructed at one end as a thumb piece H, projecting outside the meter mechanism—the part which is inside the mechanism being slotted at I to receive the coin.



Mackay and Anderson's Prepayment Gas-Meter.

On the rod H is fixed a flanged casting with a slot K in it corresponding to the slot in the rod G. This flange part serves to close the slot at all times except when the rod is in position to receive the coin through the slot.

The standard D also carries two stops, against which the top edge of the part J above abuts, when the rod is in such a position that its slots I K coincide with the slot E in the standard D—that is, when the mechanism is in position to receive the coin.

The inner end of the rod G is carried in a sleeve mounted in the middle standard; and this sleeve has connected with it a ratchet-wheel O, for co-operating with a pawl P, also mounted on the standard, in order to prevent backward rotation of the sleeve after a coin has been inserted and the motion of the sleeve started in one direction. Connected with the sleeve is a tube Q, slotted to receive a pin carried on a worm shaft T, which passes through one of the standards and through an internally toothed sleeve U, which is connected by mitre wheels V and W to the change-gear shaft X of the meter.

The rod T is connected by the bar Y with a further rod Z, journalled and capable of sliding through extensions in two of the standards; the rod Z bearing on its end a pin for rotating a third shaft R (having a screw thread of high pitch) which is connected to a pointer to indicate the number of coins which have been inserted in the meter and the number which have not been used at any instant. The shaft also carries a pin which forces one end of a lever S into such a position that, when the full number of coins has been inserted in the meter, the lever closes the slot E, and prevents further coins being inserted. A slot in the base-plate of the mechanism below the slots I and K enables the coins to drop into a collecting box in the part V.

In operation, a coin is inserted in the slot E and falls into the slots K and I. The thumb-piece H is then turned whereby the coin-rod G and the slotted tube Q are rotated, whereby, because the toothed sleeve V is stationary, the screwed rod T is fed forward, thereby causing indication to be given that a coin has been inserted. The meter in operation effects rotation of the screwed sleeve U from the gears W and V, and so moves the rod T in the opposite direction.

Treating Metals and Liquids by Gaseous Heat.

BONE, W. A., of Leeds University; WILSON, J. W., of Armley, near Leeds; and M'COURT, C. D., of Balham Hill, S.W.

No. 625; Jan. 10, 1911.

This invention relates to the heating and melting of metals and the heating of liquids by the combustion of gaseous fuel—being a development of patent No. 4362 of 1910, "wherein the combustion of gaseous fuel is caused to take place in tubes packed with granular refractory material arranged in a boiler or like for the purpose of raising steam and treating liquids generally."

The patentees say they have found, as the result of numerous experiments, that the process of combustion described in their 1910 specification can be applied to the melting of certain metals; and they "have succeeded in devising and constructing apparatus adapted for the melting of metals and the like purposes."

Fig. 1 is a sectional view of an arrangement adapted for the melting of type-metal. Fig. 2 is a sectional view of a modified form of fig. 1. Fig. 3 is a sectional view of a burner adapted for the heating of liquids. Fig. 4 represents a further modified form of apparatus.

The burner in fig. 1 is adapted to melt alloys or metals of low melting point contained in crucibles or melting pots or baths. C is an iron tube adapted to be immersed in a bath of metal and provided with a gaseous mixture supply pipe A having suitable valves V V^1 for the supply and regulation of the air and gas. The pipe A leads to the base of the casing C—a tube from 2 to 3 feet long, with a diameter of 3 inches or thereabouts. The elbow connecting the pipe to the casing is provided with a fire-clay entrance nozzle or plug N. The gaseous mixture passes through this nozzle into a bed of refractory granules G—by preference, magnesite broken to pass a sieve of one

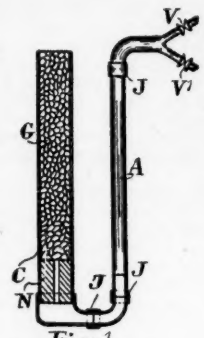


Fig. 1.

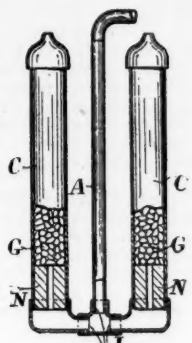


Fig. 2.

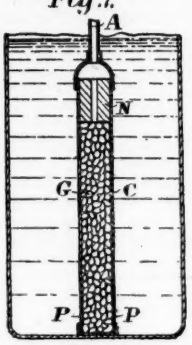


Fig. 3.

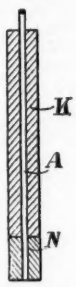


Fig. 4.

The Bone-Wilson-M'Court Metal and Liquid Heater.

mesh to the linear inch (the finer particles, such as will pass a sieve of two meshes to the linear inch, being taken out). The casing C is open at the top. The mixture is ignited in the bed by first turning on the air, applying a flame to the open end, and then turning on the gas until ignition occurs and combustion takes place at the base of the column of granular material, when the heat generated becomes rapidly communicated to the surrounding metal.

Experiments have shown that care must be exercised in the construction of the various joints. For example, the nozzle or plug in the casing C should be secured by winding the nozzle with asbestos string, and the whole exterior be then plastered with a paste of burnt fire-clay (ground 30-mesh) mixed with viscous sodium silicate. The other joints J are autogenously welded, "so as to prevent the possibility of molten metal entering at the joints."

In fig. 2, the casings C are in duplicate; and the outlets or tops are provided with hollow caps, which, while allowing the products of combustion to escape, reduce the noise made during combustion.

Where material in a fragmentary form is required to be heated or melted, and it is permissible to develop the combustion within the mass of material itself, the casing separating the zone of combustion from the material heated may be dispensed with; the gaseous mixture being merely led into the mass by means of a short pipe protected from overheating by fire-clay sleeves, as shown in section in fig. 4, where A is the pipe, N the fire-clay plug, and K the protecting sleeves.

The arrangement for heating liquids will depend partly on the nature of the liquid to be heated. The chamber C, in which the combustion takes place, will be constructed of, or encased in, a material of a nature such as not to be seriously attacked by the liquid. Thus, for heating water and solutions, the copper or iron chamber C, of the types shown in figs. 1 and 2, may be employed. For the heating of acids, an iron chamber covered externally with sheet-lead may be employed; while in other cases an iron or copper chamber, nickel-plated on the outside or coated with other suitable substances, may be employed. When a lead-coated chamber is employed, it will generally be found desirable to line the interior of the casing with fire-clay, to prevent its being unduly heated and corroded by the products of combustion. Where the nature of the liquid is such as to admit of passing the products of combustion through it, the chamber C (as fig. 3), in which the combustion takes place, may be completely enclosed as by a cap, with perforations P towards the base of the chamber, and the gaseous mixture supply pipe entering at the top as shown. The burner is ignited and then immersed in the liquid; and the products of combustion issue from the perforations and give up a further quantity of heat to the liquid which they traverse, and also mechanically agitate the liquid.

Coking Coal.

DOHERTY, H. L., of New York, U.S.A.

No. 11,276; May 10, 1911.

This invention relates (in particular) to apparatus in which the coking of the coal is performed by the direct action of a gas-flame; the products of combustion from the flame and the gases from the quenching of the coke being drawn through the coke.

The patentee claims: In an apparatus for coking coal of the kind described, a coking-chamber having a plurality of gas-burners inclined so as to direct the flame in a downward direction upon the charge at substantially the middle portion of the upper surface; means whereby the exact quantity of air required for the consumption of the gas is introduced with the gas into the chamber; an enclosed quenching chamber separate from the coking-chamber but in communication with it, and containing a stepped grate; means for spraying water on to the grate, and for withdrawing coke from the quenching chamber; water-jacketed poke-holes in the dome, and poke-holes in the walls of the coking-chamber; and a manhole in the quenching chamber—all arranged and operating in the manner described in his specification.

Street Gas-Lamps.

PARKINSON AND W. & B. COWAN, LIMITED, of Birmingham, and LANGLANDS, S. B., of Glasgow.

No. 272; Jan. 5, 1911.

The object of this invention is "to provide externally-operated means whereby the suspended burner and its cognate fittings can be raised from the outside of the lamp clear of the interior of the lamp body when the reflector and glazing are required to be cleaned, so as to thereby prevent accidental damage to the mantle or depending glass chimney, and also facilitate the cleaning operation."

Fig. 1 is an elevation (partly in section) of a street-lamp with improvements constructed in accordance with this invention (a modified arrangement being represented by dotted lines). Fig. 2 shows a top of the lamp (with the top removed). Fig. 3 is a vertical section, with the burner in its normal or lowered position, and showing a modified arrangement for raising the gas-arm in dotted lines. Fig. 4 represents an elevational view of the burner and gas-arm in its raised position. Fig. 5 shows a section.

Arranged over the burner in the top of the lamp (which is hinged at one side) is a conical flue E, whose upper end leads to a cowl, and thence to the atmosphere. The burner is carried by the end of a rising and falling pipe F passing through a vertical slot in the side of the flue. It is provided at the end opposite to the burner with a T-shaped tubular junction piece G, whose cross-head or sleeve part can turn upon a stationary plug having an axial gas-passage, carried at the end of a fixed gas-pipe H, and forming a gas-way connection.

To raise and lower the arm F, and so lift the burner clear of the interior of the lamp body, a spindle J, carrying a worm, is mounted to turn in bearings in a pair of brackets K, attached to the frame of the

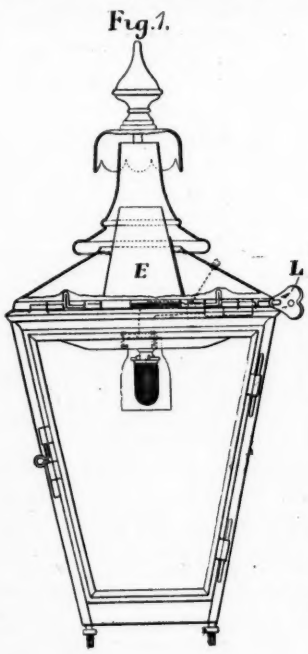


Fig. 1.

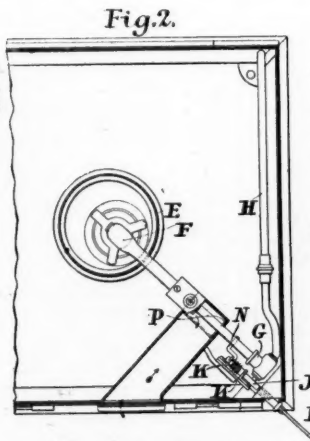


Fig. 2.

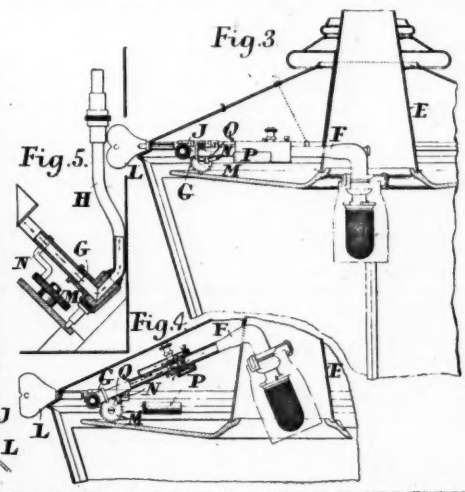


Fig. 3.
Fig. 5.

Parkinson-Cowan and Langlands' Street Gas-Lamp.

lamp, and adapted to be rotated from outside by a detachable key or thumb-piece L fitting upon the square outer end of the spindle. The worm engages with a worm-wheel M, which carries upon its outer face a crank arm N, which comes under the gas-arm F, and when the worm spindle J is turned in the one direction the motion is transmitted to the crank; and thus the gas-arm, with its attached burner, is lifted. When, however, it is turned in the opposite direction, the burner falls by gravity until the arm F is arrested by a stop P carried by the open end of a shaft leading to outside the lamp, and supplying air direct to the air inlet of the burner. To limit the raising of the burner, there is a stop Q upon the underside of the arm F, against which the crank N engages when the burner is fully lifted. To close the slot in the side of the flue E when the lamp is in use, the flue is provided with a swinging flap R so that when the arm F is raised the flap is moved to one side, and when the arm is again lowered the flap falls by gravity into its original position and closes the slot.

LEGAL INTELLIGENCE.

THE VALUATION OF THE EDINBURGH AND LEITH GAS UNDERTAKING.

Lord JOHNSTON, Lord SALVESEN, and Lord CULLEN, sitting in the Court of Session as the Valuation Appeal Court, gave judgment in the appeal of the Edinburgh and Leith Gas Commissioners against the decision of the Valuation Committee fixing the valuation of the undertaking in the city at £94,393, and claiming a reduction to £87,745.*

Lord SALVESEN, who gave the judgment of the Court, said the Assessor had followed the method of valuation of the appellants' undertakings sanctioned by a series of prior decisions. Two objections were taken to his valuation—the first being that he ought to have allowed the reduction of feu duties paid by the Commissioners in respect of land belonging to them, and the second that he should have deducted the landlord's taxes. These deductions were claimed as the legitimate result of certain prior decisions, the last of which was obtained at the instance of the same appellants in 1909, and in which a deduction was permitted on administrative charges. He agreed with Lord Low on that occasion, that it was difficult to find a logical basis for the view that expenditure which in the ordinary practice would fall upon the landlord should be deducted upon hypothetical rent, while in the case of a profit-earning concern it would be legitimate to take into account, in fixing such a rent, the amount which the tenant would require to pay by way of tenant's profits; and as these had been disallowed in the case of statutory undertakings where neither landlord nor tenant was entitled to make profit to carry on the undertaking, it was perhaps only equitable that there should be some set-off in the way of deducting from the valuation expenses which would ordinarily fall upon the landlord. In most of the previous cases it had been suggested that such matters as feu duties which fell to be paid out of rent or taxes which fell to be paid upon the rent after it had been ascertained could be taken into account in order to reduce the valuation. The fact that there had been a departure from the logical basis of valuation, now so well established that it was undesirable to go back upon it, was no ground for carrying the illogicality any further. He declined to allow the deduction in respect of rates and taxes, holding that what was imposed and might be directly recoverable from the landlord could not be said to be tenant's expenditure. Had the matter been open, he would prefer to have had fixed the hypothetical rent of an undertaking such as the appellants' on the ordinary footing, and without regard to circumstances which led the Court to sanction a departure from this method that there was a prohibition against profit-earning. He was of opinion that they should adhere to the Assessor's valuation affirmed, as it had been, by the Court below.

In this opinion, Lord JOHNSTON and Lord CULLEN concurred. The appeal was therefore dismissed.

CLAIM FOR COMPENSATION BY A GAS MANAGER.

At the Thetford County Court some weeks ago [see "JOURNAL" for Dec. 12, p. 770], before his Honour Judge Mulligan, K.C., John Stinton, formerly the Working Manager of the Brandon Gas Company, sued the Company for compensation for the loss of a leg, due, as alleged, to an accident which happened to him in the course of his employment. In support of the claim, it was stated that on the morning of July 27, 1910, when engaged in drawing the retorts, a lid fell on to applicant's left foot. He remained at work for a few weeks, but had to give up on the 18th of September. A medical man was sent for, and applicant was treated for rheumatic gout. Being dissatisfied, he called in Dr. Harris, of Thetford, who diagnosed the complaint as gangrene of the lower half of the foot. The line of gangrene corresponded with the seat of the injury. Dr. Harris saw it was a case for operation; and on the 18th of October applicant was sent to the Addenbrooke Hospital at Cambridge, and shortly afterwards was operated upon—the lower part of the foot being amputated. This was not altogether successful; and on the 20th of December the left leg was taken off below the knee. On the 4th of January he returned home. On coming out of the hospital, in consequence of something which was said, he gave notice to the Company, and the matter passed into the hands of solicitors. Applicant said he had been in the employ of the Company for eleven years, and had had good health. After the accident, the Company paid him full money up to Sept. 29, then £1 a week until Oct. 13, and 10s. a week to May 31. On the 9th of January, Mr. Brown, the Secretary of the Company, called to see him, and asked him to write a letter to the Company with regard to the accident. He did so; and sent a letter to the Chairman and Directors. At the end of July, Mr. Brown brought him a receipt for £10, which was offered in full settlement of any claim; but he refused to sign it. He was now in receipt of outdoor relief. There was no one with him in the retort-house when the accident occurred; and, with the exception of his wife, he did not tell anyone about it at the time. He did not tell Dr. Lowther, who first attended him, about it, nor the doctors at Cambridge. He gave no notice to the Company, because compensation never crossed his mind. Judgment, which was reserved, was delivered last Thursday.

His HONOUR said the Gas Company were the nominal respondents; but the claim was opposed in reality by the Employers' Liability Insurance Company. One ground upon which the claim was disputed was that notice of the accident was not given, as required by the Act. The Act, however, said want of notice was not a bar to a claim where an employer was not prejudiced, or where such omission was occasioned by mistake or other reasonable cause. The fact that the Company made payments to the applicant for some time after the occurrence indicated that the Directors were acting upon full information with regard to the accident; and after they had actually sent a claim in to the Insurance Company, they continued to make him an allowance until the Insurance Company intervened. He need not dwell upon the cruel attempt to get this crippled workman to release his claim for £10, when, in dire distress, he applied for money to get a cork leg; for this attempt failed. The weekly payments that had been made induced Stinton not to give any other notice of the accident than he had done; and this omission was, in all the circumstances, "occasioned by reasonable cause." Dr. Harris was right in his opinion that the gangrene was due to the accident. Stinton's present incapacity was therefore due to the injury caused by the retort-lid falling on his foot; and so he awarded him compensation at the rate of 19s. per week. He ordered the arrears to be paid into Court within seven days, and the costs to be based on Scale C.

Dispute as to a Gas-Governor.

In the King's Bench Division of the High Court of Justice last Tuesday, Mr. Justice Hamilton and Mr. Justice Lush had before them an appeal by Mr. G. Clark, of the North British Steel-Works, Sheffield, from a decision of His Honour Deputy-Judge Layman, at the Southwark County Court, who gave judgment in favour of Messrs. Tice and Co., Limited, of Union Street, Southwark, S.E., in an action brought against the appellant for the sum of £20, the price of a gas-governor. In the Court below, the claim was made on the ground that there was a contract with Mr. Clark to buy the governor if it showed a saving of from 10 to 20 per cent. of gas. He, however, said he would allow the apparatus to be fixed on the understanding that the saving of gas would be as stated, and that he was allowed a reasonable time—say two months—to decide whether he would purchase. The governor was fixed, and Messrs. Tice's representative found it was saving 12½ per cent. of gas, but was not acting satisfactorily; and Mr. Clark was thoroughly dissatisfied with it. Immediately afterwards, he was called upon to pay for it; and he declined to do so as he had not had time to form an opinion in regard to its working. The learned Judge in the County Court decided that having the governor fixed and allowing it to be tested were sufficient to establish a contract between the parties; but he altogether overlooked the condition that Mr. Clark was to have two months' trial of the apparatus before he determined as to buying it. On behalf of Messrs. Tice, it was submitted that there was an oral contract between Mr. Clark and their representative, and that it was concluded when the governor was fixed. Mr. Justice Hamilton said it seemed to him quite clear that Mr. Clark had asked for the apparatus to be fixed on the conditions specified. Messrs. Tice, therefore, had not proved their contract, and there was no evidence to support the finding of the Judge in the Court below. This would accordingly be set aside, and judgment entered for the appellant, with costs. Mr. Justice Lush concurred. An order was made accordingly, with costs; and leave to appeal was refused.

Alleged Theft of Gas.

Peter Martin, described as an engineer's fitter, a Russian subject, of Retford Street, Shoreditch, was charged at Old Street Police Court, last Thursday, with stealing 1000 cubic feet of gas, value 2s. 6d., the property of the Gaslight and Coke Company. Mr. Humphreys (who prosecuted) said the robbery was one of the most barefaced and impudent on record. The prisoner had for the past eighteen months occupied a house in Retford Street; and during this time he had not made any arrangements with the Company for the consumption of gas. Before the commencement of prisoner's occupation of the premises, the gas had been laid on; but the meter had been taken away in 1908, and had not since been replaced. Information had reached the Company that gas had been seen burning in the house, and a watch was kept, which showed gas being burnt at least on two floors. Then a warrant was applied for; and on a visit being paid to the house, several gas-burners and two gas-rings were found in use. Evidence of arrest having been given, the Magistrate (Mr. Biron) asked how the prosecution intended to connect the prisoner with the larceny. Mr. Humphreys replied that he would prove the prisoner to be the occupier of the premises. It had already been decided that gas could be the subject of a larceny. William Holgale, an employee of the Gas Company, said the previous day he visited the prisoner's house in company with the police, and found various fittings connected to the service-pipe, which should have been stopped with a cap. This had been unscrewed, and lay on a shelf underneath. It was said that the consumption of gas by the burners seen in use would be quite 100 cubic feet per hour; and a remand was asked for to ascertain, if possible, how long the theft of gas had been going on. Prisoner was remanded accordingly.

* See "JOURNAL," Vol. CXVI., p. 771.

Since his appointment as Gas and Water Manager to the Atherton District Council, Mr. W. T. Duxbury has made a general survey of the gas-works and plant; and at the last meeting of the Council, his report recommending alterations and improvements was adopted.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Gas-Fire Construction.

SIR,—It is with great regret I notice that Mr. Yates dismisses an article of mine in your issue of Jan. 23 with the remark that "when a writer publicly links what is ostensibly a technical article with a private firm's advertisement in the same issue, one realizes that his object in writing it is a different one from mine, and that the article is indeed written 'from another point of view.'"

Although I can disclaim any knowledge or responsibility for the advertisement to which I assume he refers, I feel that this unfair suggestion prevents me from further pursuing, as I had hoped, an interesting and valuable controversy; and I can only bow to the sentence of excommunication passed upon me *ex cathedra*.

If motives of this kind are imputed to me, I do not propose to take the matter any further, except to point out that this unfortunate occurrence has afforded Mr. Yates an excuse for avoiding discussion.

The statements contained in my article in the "JOURNAL" for Jan. 23 have been "established and demonstrated at every stage by actual systematic testing and analysis." Neither of us is in the fortunate position of being entirely disinterested, as, with the best intentions, we are both, perhaps unconsciously, biassed in favour of the type of apparatus with which each of us is connected.

I would point out, with the greatest possible respect, that the writer of the articles in your issues dated Oct. 24 and Jan. 16 cannot, from his associations, occupy a judicial seat; nor can he even claim to be a member of the jury. At best, he can only appear as "counsel for the defence" to answer the indictment made on page 210 of the "JOURNAL." He appears to have been conscious that this was his position when he wrote his letter, and has acted on the old instructions to the "counsel for the defence," "When in doubt, abuse the plaintiff's attorney."

THOMAS GLOVER.

Edmonton, Jan. 31, 1912.

SIR,—With reference to the advertisement on p. 237 of your issue of Jan. 23, to which Mr. H. James Yates refers in his letter on the "Construction of Gas-Fires," p. 299 of your issue of Jan. 30, will you kindly allow me to point out that Mr. Thomas Glover knew nothing whatever of this advertisement; and, further, that, owing to a misunderstanding between our Advertisement Manager and the Advertisemeut Department of the "JOURNAL," the reference in the advertisement on p. 237 was incorrectly given.

The wording should have read "See Article on p. 149." As the advertisement to which we have referred and Mr. Thomas Glover's article appeared in the same issue, it is obvious that we could not be aware of the page on which this article would appear.

R. & A. MAIN, LIMITED.
per A. J. Crichton, Secretary.

Gothic Works, Edmonton, Jan. 31, 1912.

[We can confirm the statement made in the above letter, as to the misunderstanding that resulted in the reference in Messrs. R. & A. Main's advertisement in the "JOURNAL" for Jan. 23 being to Mr. Thomas Glover's article instead of to Mr. Yates's article in the issue for Jan. 16.—ED. J.G.L.]

SIR,—We have read with interest the recent articles on "Gas-Fire Construction" by two of our competitors, which have appeared in the "JOURNAL," and to avoid any suggestion of our own letter appearing in the form of an advertisement, we enclose you one of our business cards and subscribe a *nom-de-plume*.

The primary and essential feature of every gas-fire is that it shall be hygienic under almost every possible condition; and until this desideratum is attained, gas-fires will never meet with the universal public approval that they should deserve. The idea still prevalent to a large extent in the lay mind is that a gas-fire "smells," or that it has an "unhealthy, drying effect upon the atmosphere"—an idea formed (and justly so perhaps) by the gas-fire of a few years ago with its unscientifically constructed canopy, its so-called heating chambers, and its indiscriminate packing of fuel, and consequent imperfect combustion. In spite of the great improvements embodied in the modern gas-fire, it is to be regretted that there are still many types on the market to-day which, unless working under distinctly favourable conditions, with a good up-draught in the chimney, do bye-pass some of the products of combustion into the room.

Satisfactory canopy and flue construction, which alone will ensure the whole of the products of combustion taking their right course, cannot be attained by guesswork or rule-of-thumb methods. This all-important feature of a thoroughly hygienic gas-fire is one of which we have made a scientific study for a considerable period; and the practical results of our research work in this direction were embodied in a new series of fires which were placed on the market in the autumn of last year.

It is not a difficult matter to chemically determine whether a fire is bye-passing carbonic acid into the room. If such a test be carried out with a fire passing rather more than its normal gas consumption and having no elbow or flue-pipe attached to assist in pulling the products of combustion into the flue, and aspirations of the air at various points taken outside, but in close proximity to the canopy, show that no bye-passing is taking place, then the fire must be hygienic under the widest possible range of conditions. This is the method that was adopted in the testing of the fires referred to above; and we claim (without wishing to be dogmatic) that no gas-fire should be placed on the market until it can successfully pass this test.

There is no doubt that gas-fires, faultily constructed from a hygienic point of view, not only do harm to manufacturers of these appliances generally, but damage the reputation of one of the most useful functions of gas—namely, that of domestic heating.

In conclusion, therefore, in the interests of the gas industry as a whole, we suggest that an independent authority should be appointed—say, by the Institution of Gas Engineers—who would hall-mark, so to speak, every type or pattern of gas-fire before it would be accepted by gas engineers as a thoroughly hygienic appliance. If this suggestion could be adopted, we should hear no more of gas-fires that smell, &c., &c., and a fresh impetus would be given to the use of gas as a domestic heating medium.

"ODOURLESS."

Feb. 3, 1912.

Glasgow Smoke Abatement Exhibition.

SIR,—I notice an announcement in the Technical Press to the effect that the above exhibition is to be under the auspices of (among other bodies) the Society of British Gas Industries.

Permit me to state that this announcement is, so far as this Society is concerned, entirely incorrect. The question of the Society officially recognizing the exhibition, has up to the present never been discussed by my Council. The Manager of the Exhibition has raised the question with my Council; but, after the experience of the last Smoke Abatement Exhibition held in Glasgow, it is clear that—unless there were some definite prospect of the terms offered by the Glasgow Corporation to their consumers for the hire of gas appliances being substantially improved, so as to approximate in some degree to those obtaining in other large centres—there seems little likelihood of the members of the sections most interested finding it possible to entertain the question of taking part in the exhibition without facing serious financial loss.

ARTHUR L. GRIFFITH, Secretary,
Society of British Gas Industries.

46, *Queen Victoria Street, Jan.* 30, 1912.

Cooking: Gas v. Electricity.

SIR,—I see a note in the "Electrician" and a letter by Mr. Grogan, the former referring to my letter in last week's issue of the "JOURNAL." The "Electrician" not only criticizes my letter, but says I know nothing about cooking.

I served an apprenticeship to the trade of a baker and confectioner; and having been practically all my life connected with the gas apparatus business, experience (not "theory") has proved to me that a gas-oven, "if used on right lines, with the latest equipments," is the cheapest and cleanest article to have in the home of the people—especially the artisan or middle class. I not only claim to know what I am talking about, but I am prepared to prove by my work—which I am a teacher of—that I can roast a leg of mutton, and bake two pies, bread, a current cake, a jam tart, and a sponge sandwich, at one and the same time as the meat is roasting, in my gas-oven. The "Electrician" says these articles of food could not possibly be cooked satisfactorily in *any* single oven at the same time, and that I have got this brilliant idea from the highly-coloured posters of gas-cookers. It further says that I avoid the practical conditions which obtain in a kitchen, and that the only merit in my letter lies in the proposal for a public competition between gas and electric cookers on one and the same platform.

I have said I can do certain things; and I have named them. Now, Mr. Grogan, here in my own house at Southport is a gas-stove fixed, suitable for my family's requirements. There is no fixed flue-outlet. For two years and four months it has roasted and baked all we require for seven or eight persons; and it has never once been washed out. No gas men have ever been required to keep it in order—in fact, they have never once been to it. If you prefer (as you name a kitchen), and really desire to prove whether you or I know really what we are talking about, I am prepared to undertake to roast and bake here, in my gas-oven, the articles herein mentioned. The gas-oven is a trifle ancient, as it had been out working for over nine years, so the gas company informed me when they fixed it.

Understand clearly, no shuffling. I will take you on; and the arrangements shall be, as you say, by independent authorities. I will go further. I will not ask you or your backers of electricity to fix an electric oven here in Southport or elsewhere. But what I do ask is that you put down £20 to my £20; and if I fail to do in the gas-oven here what I state, the money is yours. If I do what I say, the money is mine. The test itself will then prove one of two things—that I am either a fraud or a gas-stove specialist. If I fail, you will have full liberty and right to brand me as a fraud. If I do what I claim I can do, then I shall hope to go on calling myself a gas-stove specialist.

My time is pretty fully occupied attending to inquiries that are coming along from gas companies, not only in the United Kingdom, but abroad, asking for particulars and my method of handling the gas-oven; and my copyright instructions explain how I get these results. What I can do, any housewife also can do, if she has the appliances supplied to her gas-oven. If Mr. Grogan and the backers of electric cooking will average (per week) the articles that have been roasted and baked in this "old crock" of a gas-oven (see the "JOURNAL" for Jan. 9), this will give them food for thought. My gas account has never reached £1 per quarter for lighting and cooking. Now, if these men of electricity will put down £5, I will prove this too, or else pay them £5.

What I did for gas cooking at the Manchester Exhibition seems to have upset their plans somewhat. Can Mr. Grogan or his backers equal me in keeping three pans boiling on the flat at one time with one burner alight? Now all you electricity people—nobody barred—you have the chance of your lifetime of proving whether your methods or mine are the cheapest, cleanest, and best for roasting and baking. Name the day your independent authorities want to see this done.

R. G. MARKS, Gas-Stove Specialist.

6, *Blair Grove, Southport, Feb.* 3, 1912.

The note in the "Electrician" referred to in the foregoing letter is as follows: We may also refer to the challenge to Mr. Grogan of a Mr. R. G. Marks, describing himself as a gas-stove specialist, of Southport. This challenge is made in a letter to the "JOURNAL OF GAS LIGHTING,"

and suggests that the correspondent should meet Mr. Grogan in a public contest with electric and gas cookers. These are to be brand new cookers (for obvious reasons from the gas point of view), and each competitor (to quote the letter) shall "make and bake (say) six different things. I mention these as useful for the average family: A leg of mutton, two loaves of bread, an apple pie, a rice pudding, a Yorkshire pudding, and a sponge sandwich—*all to be baked during the time the meat is cooking.*" The italics are ours, and we emphasize this stipulation, because it reveals what is undoubtedly a "booby" trap, and one into which a man like Mr. Grogan will not readily fall. Mr. Marks may be a gas-stove specialist, but, apparently, he knows nothing about cooking. He may possibly be interested to learn that all the articles of food referred to could not possibly be cooked satisfactorily in *any* single oven at one and the same time. Doubtless Mr. Marks gets this brilliant idea from the highly-coloured posters of gas-cookers which show some such meal as the above crowded into the compass of a single oven, and in such positions that it would be quite impossible for any housewife to get any result worthy the name. Further, Mr. Marks avoids the practical conditions which obtain in a kitchen by conducting the contest in a public hall where his oven would be directly connected to a large gas-main. The only merit in Mr. Marks' letter to our contemporary lies in the proposal for a public competition between gas and electric cookers on the same platform. We will not suggest the choice of weapons; rather would we have the arrangement of the contest outlined by independent authorities, when we should have no doubt in our minds as to the result.

The Ilkeston Gasholder Accident.

SIR,—May I claim a little of your space to ask a question regarding the Ilkeston accident?

We had a cold snap at the time of the disaster; and it occurs to me that the inner lift may have become unsealed through a defective anti-freezing apparatus. It would be interesting to know if anti-freezers were in operation; and, if so, the type in use. Although I have had no personal experience of spiral-guided gasholders, I know ordinary gasholders have suffered in this way.

ASSISTANT.

Feb. 3, 1912.

Gas Profits and Rate Relief—The Salford Case.

SIR,—I have been much interested in the last issue of the "JOURNAL." At Sidmouth we have had a poll upon the question of the purchase of the gas-works by the Council, with this result: For the purchase, 555; against, 303. I am against it, and our opponents anticipate very large profits and contributions in reduction of rates. I have mentioned the Salford case as a possible modification of their great expectations; and I should be very glad to know what is the opinion of yourself and of reliable experts as to whether our Bill, which will shortly come on, will be affected by the Salford decision. If there is likely to be a limit of 1 per cent., perhaps our opponents' enthusiasm may somewhat evaporate. The Agents (Messrs. Baker and Co.) are of opinion that the Salford decision does not at all affect our case.

JOHN TINDALL.

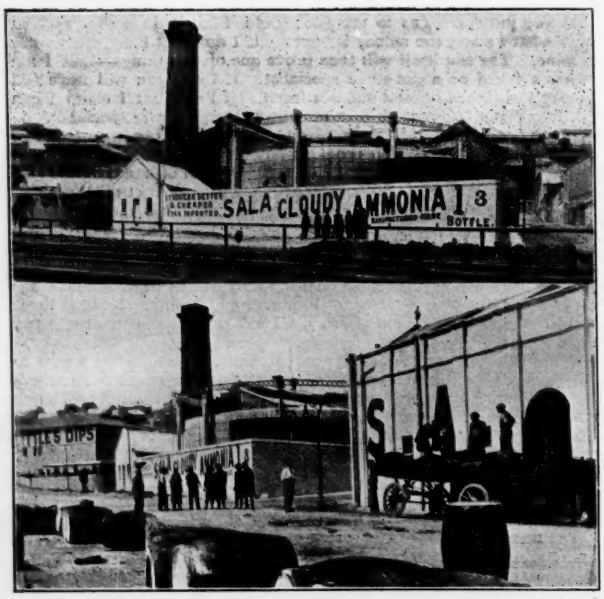
Marino, Sidmouth, Feb. 2, 1912.

Gas Affairs in South Africa.

SIR,—Here are a couple of photographs of a portion of our works at Port Elizabeth, showing how we utilize our walls as an advertisement for our goods.

I think we are the only gas company who manufacture, make up, and sell, both retail and wholesale, "cloudy ammonia." "Sala Cloudy Ammonia" is now getting known all over South Africa. At Kimberley, where the water is exceptionally hard, we have a big sale for it; and locally, we find it to have taken the place of the imported article. It does not pay to make anhydrous ammonia, as Australia and America dump it down here at 3d. per lb. under the selling price at home, and we have no duty on ammonia.

To give some idea of the excessive railway charges out here, last week we sent two tons of gas carbon to Rhodesia; and the railage per ton was £12 10s. The carbon cost £6; the railage, £25; and there were other charges to add at the end. We can bring our coal out from England for 10s. 6d. per ton freight by steamer; but to send it up to our Grahamstown works, 100 miles from Port Elizabeth, the railage is 20s. 6d. per ton with 3s. per Colonial ton duty additional and cartage extra to this.



WILLIAM ARNOTT, Manager,
South African Lighting Association, Limited.

Port Elizabeth, Jan. 14, 1912.

MISCELLANEOUS NEWS.

GASLIGHT AND COKE COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 348.]

The accounts of the Company for the six months ended Dec. 31, to be submitted with the Directors' report on Friday, consist of the usual statements, from which we take the following particulars.

The statement of capital (stock) sets forth that the total paid up is £10,264,980; added on conversion, £12,697,710—total amount authorized, £22,962,690. Deducting the amount redeemed, £139,725, the total amount of the Company's existing capital powers is £22,822,965. The statement of loan capital stands thus: Total paid up, £3,097,300; added on conversion, £1,564,405; unissued, £750,000—total amount authorized, £5,411,705.

The capital account shows receipts (with premiums, £1,669,476 8s. 5d.) to the amount of £29,154,146 8s. 5d. The expenditure is shown in the following items:—

Expenditure to June 30, 1911		£14,577,185 2 2
Expenditure during the half year to Dec. 31, 1911—viz.,		
Buildings and machinery in extension of works.	£7,044 3 1	
New and additional mains and service-pipes.	38,387 7 3	
Do. do. meters	23,891 17 9	
Do. do. stoves	39,497 2 0	
		109,821 10 11
		£14,686,306 13 1
By sale of surplus land	£28,580 1 8	
By depreciation of plant	4,919 1 2	
By depreciation of meters and stoves	54,301 15 8	
		87,833 18 6
Total expenditure		£14,598,472 14 7
Nominal amount added on conversion		14,262,115 0 0
		£28,860,587 14 7
Deduct amount of capital redeemed under Company's Act of 1903		139,725 0 0
		£28,720,862 14 7
Balance of capital account		433,283 13 10
		£29,154,146 8 5

The following is the revenue account:—

Expenditure.

December Half Year, 1910.		£ s. d.	£ s. d.
	Manufacture of gas—		
£555,515	Coal, including all expenses thereon	535,426 17 5	
47,085	Oil ,, less value of oil tar	47,225 16 0	
40,489	Coke and breeze used in the manufacture of carburetted water gas	42,530 12 0	
15,573	Salaries of Engineers and other officers at works	15,984 4 6	
97,198	Wages	106,397 7 5	
16,466	Purification	18,832 3 6	
206,593	Repair and maintenance of works and plant, materials and labour, less received for old materials, £5492 18s. 4d.	206,122 14 3	
	Distribution of gas—		972,819 14 11
52,137	Salaries and wages of officers (including rental clerks)	55,879 11 2	
87,242	Repair and maintenance of mains and service-pipes, &c.	89,172 8 9	
7,944	Repair and renewal of meters	73,756 7 4	
83,658	,, ,, stoves	88,793 14 11	
33,655	Gas fittings, including labour (automatic meter supplies)	29,689 16 5	
			337,791 18 1
28,036	Public lamps—lighting and repairing	..	31,334 11 4
	Rents, rates, and taxes—		
6,758	Rents payable	6,896 11 8	
151,189	Rates and taxes	162,726 4 4	
			169,622 16 0
	Management—		
3,750	Directors' allowance	3,750 0 0	
202	Company's Auditors and Assistant	301 2 0	
9,820	Salaries of General Manager, Secretary, Accountant, and clerks	10,182 5 5	
26,059	Collectors and cashiers	26,167 18 0	
6,762	Stationery and printing	4,589 16 6	
6,717	General charges	7,561 19 6	
			52,854 1 9
16,000	Co-partnership for the half year	..	18,000 0 0
669	Parliamentary charges	..	419 16 7
1,325	Law charges	..	1,440 9 6
900	Charges *re* Quinquennial re-valuations	..	..
8,454	Bad debts	..	6,273 5 9
500	Depreciation fund for works on leasehold lands	..	500 0 0
27,027	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	26,946 11 6
2,235	Workmen's compensation account	..	2,010 11 7
..	Stamp and conveyance duties under the Company's Act of 1911, on account	..	5,000 0 0
	Public officers—		
856	Gas Referees and Official Auditor	856 18 11	
773	Public testing-stations	578 4 10	
			1,435 3 9
£1,60-,488			1,625,979 0 9
691,835	Balance carried to net revenue account		652,348 9 5
£2,299,323			2,278,327 10 2

Receipts.

December Half Year, 1910.		£ s. d.	£ s. d.
	Sale of gas—		
	Per meter, at 2s. 7d. and 2s. 2d. per		
£1,579,978	1000 cubic feet	1,516,967 13 3	
68,230	Public lighting and under contracts	65,516 4 8	
			1,582,483 17 11
£1,648,208			
66,180	Rental of meters	..	68,325 4 6
55,018	Rental of stoves	..	58,164 12 5
65,112	Rental of fittings	..	74,167 18 8
	Residual products—		
£286,541	Coke, less £38,149 8s. 9d. for labour, &c.	296,859 8 9	
19,312	Breeze, less £8006 15s. 0d. ,,	22,358 2 0	
55,268	Tar and tar products	67,147 16 7	
	Ammoniacal liquor and sulphate of		
97,849	ammonia	103,855 10 1	
			490,220 17 5
£458,970			
£5,521	Rents receivable		4,645 19 3
314	Transfer fees		319 0 0
£2,299,323			2,278,327 10 2

The balance applicable to the redemption fund and to dividend on the ordinary stock is £1,124,215 4s. 6d.; and the following statement shows how it is proposed to appropriate it :—

Dec., 1910.			
£542,370	..	Net balance brought from last account	£699,350 1 7
470,839	..	Net revenue for the half year	424,865 2 11
£1,013,209			£1,124,215 4 6
10,000	..	Contribution to redemption fund	15,000 0 0
(£4 13s. 4d. p. ct.)		Dividend on the ordinary stock—	
£377,520	..	£4 14s. 8d. per cent. per annum on £16,160,600	382,467 10 8
£625,689	..	Balance carried to next account	£726,747 13 10

The three statements relating to the reserve, special purposes, and depreciation funds stood as follows on Dec. 31 : Reserve fund, £59,775 ; special purposes fund, £236,655 ; depreciation fund, £78,809.

The following statements relate to the working :—

Statement of Coal Used, &c.

Description of Coal.	In Store June 30, 1911.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1911.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	87,167	1,021,815	872,312	1,742	234,928
Cannel	2,598	..	70	..	2,528
Total	89,765	1,021,815	872,382*	1,742	237,456

* In addition to this quantity of coal, 6,936,656 gallons of oil were used during the half year.

Statement of Residual Products.

Description.	In Store, June 30, 1911.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1911.
Coke—tons	39,466	552,655	115,688	453,940	22,493
Breeze—tons	2,097	88,506	11,329	75,414	3,860
Tar, from coal only—galls.	1,309,530	8,409,181	7,913,335	439,245	1,366,131
Ammoniacal liquor—butts	22,046	284,339	284,403	..	21,982

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*13,435,214	468,713	12,050,064	12,665,709	46,420
†13,602,533	456,210	12,183,365	12,792,178	47,404

* Including 3,103,996,000 cubic feet of carburetted water gas. † Dec. half year 1910.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £145,144 ; gas oil, £32,874 ; coke, £14,796; tar and ammoniacal liquor and products, £109,837 ; and sundries, £252,221. The figures this time last year were: Coal, £149,713; gas oil, £40,376 ; coke, £11,759 ; tar and ammoniacal liquor and products, £90,356; and sundries, £245,818.

SOUTH METROPOLITAN GAS COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 348.]

The following are the principal portions of the accounts of this Company for the six months ending the 31st of December.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock ; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows : Amount received, £5,328,820 ; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows :—

Capital account to June 30, 1911			£5,074,275 3 10
Expenditure during half year to Dec. 31, 1911, viz.—			
New and additional mains and services	£2,544 13 10		
New and additional meters	1,268 16 0		
New and additional stoves	1,570 6 11		
		5,383 16 9	
Total expenditure			£5,079,659 0 7
Balance			243,160 19 5
			£5,328,820 0 0
Nominal amount added by conversion, less premium			2,996,520 0 0
Total			£8,325,340 0 0

The following is the revenue account :—

Expenditure.

Manufacture of gas—		
Coal into store, including £3758 18s. 7d. for London Port and tonnage dues	£306,287 14 8	
Purification	21,582 5 8	
Salaries of Engineer and Officers at works	15,579 8 11	
Wages (carbonizing)	48,030 11 11	
Repairs and maintenance of works and plant, less £5263 4s. 3d. received for old materials	128,491 19 11	
		£519,972 1 1
Co-partnership		16,000 0 0
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes	£42,926 8 6	
Salaries and wages of officers, including rental clerks	20,918 15 5	
Repairing and renewals of meters	27,673 13 8	
Repairing and renewals of stoves	36,593 4 6	
Repairing and renewals of gas-fittings	45,426 1 0	
		173,538 3 1
Public lamps, labour and materials £17,725 0s. 4d., less £14,870 14s. 2d. received for the same		2,854 6 2
Rents, rates, and taxes—		
Rents payable	£1,185 4 7	
Rates and taxes	53,759 7 4	
		54,944 11 11
Management—		
Directors' allowance	£2,803 2 9	
Salaries of Secretary, Accountant, and clerks	4,015 7 4	
Collectors { Ordinary	5,645 10 3	
Collectors { Slot meter	9,658 5 1	
Stationery and printing	3,505 17 8	
General charges	12,175 2 2	
Company's Auditors	75 0 0	
		37,878 5 3
Miscellaneous—		
Law charges		590 12 1
Parliamentary charges		159 1 0
Bad debts		1,78 2 2
Stolen from 3119 slot meters broken open		237 18 0
Pensions and officers' and workmen's superannuation, sick, and accident funds		7,774 14 5
Gas Referees and Official Auditor		241 3 6
Total expenditure		£815,948 18 8
Balance carried to net revenue account		214,358 0 0
		£1,030,306 18 8

Receipts.

Sale of gas—		
Michaelmas, at 2s. 2d. per 1000 feet	£259,841 11 0	
Christmas, at 2s. 2d. per 1000 feet	366,796 6 8	
	£626,637 17 8	
Public lighting	16,843 12 1	
		£643,481 9 9
Company's meters at rent: Ordinary, 95,899; slot, 257,574	£40,283 14 5	
Company's stoves at rent: Ordinary, 79,699; slot, 210,504; fires, 33,360	32,523 6 10	
Gas-fittings	37,518 9 7	
		110,325 10 10
Residual products—		
Coke, less labour and cartage	£167,241 7 9	
Breeze, less labour and cartage	2,956 14 2	
Tar and tar products, less labour	36,964 10 5	
Sulphate of ammonia ,, ,,	67,748 17 7	
		274,911 9 11
Rents receivable		1,494 5 8
Transfer fees		94 2 6
Total receipts		£1,030,306 18 8

Total amount paid in salaries for half year, £40,655 0s. 0d.
,, ,, ,, wages ,, £291,701 13s. 10d.

The net revenue account shows a sum of £301,726 11s. 2d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on Dec. 31 were as follows: Reserve fund, £192,877 19s. 7d. ; renewal fund, £32,900 ; insurance fund, £99,787. A sum of £366 is charged to this fund for loss on coal by heating.

The following statements relate to the manufacturing operations of the Company :—

Statement of Coal.

In Store June 30, 1911.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1911.
Tons.	Tons.	Tons.	Tons.	Tons.
141,742	609,262	527,150	959	222,895

Statement of Residual Products.

Description.	In Store June 30, 1911.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1911.
Coke—cwt.	587,800	6,518,609	1,534,417	4,951,520	620,472
Breeze—yards	5,600	105,289	46,311	50,678	13,900
Tar—gallons	399,093	5,120,525	5,064,984	140,539	314,095
Ammoniacal liquor—butts	8,137	193,360	190,232	..	11,265

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands. 6,532,323	Thousands. 190,884	Thousands. 5,957,051	Thousands. 6,226,833	24,391 incandes't *Nil*, flat-flame

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £129,427; coke and breeze, £21,935; tar, sulphate, and ammoniacal liquor, £64,706; and sundry plant and stores, £322,740. The figures this time last year were: Coal, £149,567; coke and breeze, £7247; tar, sulphate, and ammoniacal liquor, £39,960; and sundries, £310,592. A sum of £9900, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £57,404. The figures last year were £33,591 and £53,903.

CO-PARTNERSHIP AT LIVERPOOL.

The Liverpool United Gaslight Company have adopted a co-partnership scheme, the benefits of which are to operate as from July 1 last; and it is stated that 90 per cent. of the employees have signed the agreement under it. The following details of the scheme have been published in "Co-Partnership."

The Company's stock consists of 10 per cent. "A" stock and 7 per cent. "B" stock, which at the present market prices yield a return of about £4 11s. 3d. and £4 4s. 9d. per cent. Nine years ago, the price of gas was 2s. 8d. per 1000 cubic feet; but by reason of economies in production and distribution, it has been possible to reduce the charge to its present figure of 2s. 1d. The Directors feel, however, that it would not be to the advantage of the workers to commence a bonus scheme at the present price of gas, and have therefore decided to adopt a bonus of 15s. per cent. on wages paid for each penny at which gas is sold below 2s. 8d. per 1000 cubic feet. This will produce an immediate bonus of 5¼ per cent. on the wages of employees included in the scheme of co-partnership—a benefit that will come into operation as from July 1, 1911; the effect being as follows:—

WITH THE PRICE OF GAS

s.	d.		s.	d.	
At 2	8	No bonus.	At 2	2	Bonus at 4½ per cent.
2	7	Bonus at ¾ per cent.	2	1	,, 5¼ ,,
2	6	,, 1½ ,,	2	0	,, 6 ,,
2	5	,, 2¼ ,,	1	11	,, 6¾ ,,
2	4	,, 3 ,,	1	10	,, 7½ ,,
2	3	,, 3¾ ,,	1	9	,, 8¼ ,,

For example: 35s. per week = £91 per annum; "standard" price of gas, 2s. 8d.; selling price, 2s. 1d. = difference of 7d. × ¾ per cent. = 5¼ per cent. on £91 = bonus of £4 15s. 6d.

One-half will be invested in the Company's ordinary stock, in the names of three trustees, until the amount credited to any co-partner is sufficient for the allotment of £10 or more of stock, when a certificate will be issued in his own name. The remaining half of the bonus will be left in the Company's hands at the credit of the employee to accumulate at interest at the rate of 3 1-3 per cent. per annum, or it may be withdrawn under special circumstances by giving a week's notice, or it may also be invested in the Company's stock. There will be three trustees—viz., one director, one principal officer, and one co-partner workman; and a Committee will be appointed, consisting of twenty-four members, of whom twelve will be representatives of the workmen, elected by ballot. Of the remaining half, eleven will be nominated by the Board of Directors; the Chairman of the Company being *ex-officio* Chairman of the Management Commitee. Qualification for membership of the Committee is the holding of £25 of the Company's stock and five years' service with the Company.

Tipton Gas-Works Extensions.—At a meeting of the Tipton Urban District Council last Tuesday, the Gas Committee reported an increase in the consumption of gas for the year of 4½ million cubic feet. It was stated that arrangements were being made to borrow £10,000 for the extension of the plant, and £500 for new meters.

Ashbourne Gas-Works Purchase Scheme.—A poll of the electors has been taken on the proposal of the Ashbourne Urban District Council to apply to Parliament for power to purchase the undertaking of the Ashbourne and District Gas Company. The result was: For the purchase, 362; against, 166—majority in favour of the Council's proposal, 196.

Birmingham Water-Works.—Lecturing recently before the members of the Midland Counties branch of the Institute of Hygiene, on "The Birmingham Welsh Water Supply," Mr. E. Antony Lees, the Secretary of the Birmingham Water Department, described the gathering-ground; pointing out its suitability with regard to rainfall, purity, elevation, and possession of reservoir sites. Referring to the construction of the reservoir dams, he said that those already completed provided storage for upward of 17,000 million gallons as a reserve for compensation and supply. The aqueduct from the Elan Valley to Frankley was 73¼ miles long, 11½ miles being in tunnel, 25 miles in "cut and cover" conduit, and the rest—nearly 37 miles—in syphon or pipe-line. At Frankley there was a receiving reservoir having a capacity of 200 million gallons. With regard to filtration, the lecturer described the roughing filters, thirty in number, in the Elan Valley, and the fine sand filters, fourteen in number, at Frankley, and gave chemical and bacteriological results showing the extreme purity of the water as distributed in the district. At present, he said, the rate of consumption, on the average of the whole year, is about 21 million gallons daily—the maximum being 30 million gallons.

TOTTENHAM AND EDMONTON GASLIGHT COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Saturday, at the Offices, No. 639, High Road, Tottenham—Mr. CORBET WOODALL in the chair.

The SECRETARY (Mr. E. Topley) read the notice convening the meeting; and the Directors' report and the accounts having been taken as read,

The CHAIRMAN said: It becomes my duty to propose that they be received and adopted. The observations with which I propose introducing this resolution, I have written out, and, with your permission, I will ask the Secretary to read them for me.

The SECRETARY then read the Chairman's address as follows:

I am glad to be able to present you with another good report of a half-year's working. Thanks to several causes, of which the steady growth of population in the area we supply is one, and the efforts, effective though costly, which we make to inform and satisfy consumers, are another, our business continues to grow. So long as there is a call for more gas, we shall have a falling price and increasing prosperity.

RECORDS, REDUCTIONS, AND HARMONY.

The last half-year's working presents several records. We sent out more gas than in any similar period, and the output on Dec. 22 was the largest of any one day in our experience (7¾ million cubic feet). The dividend paid for the year is the highest yet attained; and the price of gas the lowest. This is all as it should be. The balance remaining to our credit is such that we have made a further reduction in price as from Christmas last, which will bring shareholders an increased dividend, and the co-partners a larger bonus. Amid the discontent which obtains so widely at the present time—due often and largely to want of sympathetic appreciation by those on either side of the difficulties and needs of the other, it is a matter of congratulation that we work under a system which brings all interests into harmony. In prosperity and in adversity, all share alike. I can say that, during the half year, we have had more evidence of heartiness and good-will on the part of the employees than ever before in my recollection.

LOW CAPITAL CHARGE.

Turning to the accounts, you will see that we have added £14,390 to the capital expended. This, divided by the 34 millions of increased gas sold, gives £423 per million; and the proportion of capital to business done is again slightly reduced. The charge for dividend and interest (which was this time last year slightly over 6d. per 1000 cubic feet sold) is now a little less than 6d. This charge is the lowest among Suburban Companies, with one exception.

GAS SALES AT A LOWER PRICE.

I will not trouble you with details of income and expenditure, which are set out in the accounts in your hands. We have sold 4·3 per cent. more gas, and we have in consequence used more coal and oil, and paid more in wages; yet the net cost of coal to the Company is less by nearly £3000, due to better receipts for residuals, and the gas revenue, charged at 1d. less per 1000 cubic feet than in 1910, is about £800 more. The result is that we show a better balance by £2700 than in the corresponding half of last year, and that after carrying £2000 to the special purposes fund. Under these circumstances, I think you will feel that the Board are well advised in still further reducing the price of gas.

ECONOMY OF AUTOMATIC LIGHTING.

There is one item in the accounts which I think is worthy of special note, and it is that, while the number of public lamps has increased, the cost of their maintenance and upkeep has materially diminished. This is due to the use of automatic lighters, by which, as you know, lamps in the greater portion of the Company's area are lighted simultaneously. This saves not only the cost of men who formerly had to go round with torches and ladders at untimely hours and in all weathers, but it also saves a considerable quantity of gas. The economy due to this method enables us to reduce materially the charge to local authorities for public lighting, and thus helps us still further to distance competition in price as well as in efficiency.

DISTRIBUTION EXPENDITURE AND CONSUMERS' SATISFACTION.

Another point to be noticed is the considerable amount to which the charge for repairs and maintenance of mains, services, fittings, &c., has attained. In recent years, a considerable change has taken place in the relations between gas companies and their consumers. Formerly, almost any service rendered to the consumer was a matter that had to be paid for by him; and although the charge was ever so small, it was a cause of irritation. Now-a-days, these services are rendered free in most cases. The labour attending the maintenance of burners is not charged. Gas cookers and fires are fixed at nominal rates considerably below the actual cost. We modernize burners and fittings at a charge which is less than the cost. We maintain large show-rooms with the necessary staff to enable consumers to see, and, if well advised, to buy, modern gas-fittings, &c., at a very moderate price. It is rarely that we make any charge for attendances for escapes or other complaints even on the consumer's side of the meter. The amount of money expended in thus benefiting the consumers is equivalent to a considerable charge per 1000 cubic feet; but I am satisfied that the result is worth to us at least as much as would be a reduction in the price of gas of the same amount.

RESIDUALS, COAL, AND CARBURETTED WATER GAS.

I have mentioned that the receipts for residuals have all been good during the past half year; and I am glad to say that there is no evidence of any probability of a reduction from the present standard. I regret to say, in one respect, that prices are increasingly beneficial to the Company because of the anxiety that has been, and is, felt with regard to the relations of the coal miners and their employers throughout the country. The price of coal has been, as you know, largely increased, with the result that the stocks of coke held by gas companies have been depleted and the price has necessarily gone up. We all hope that the differences to which I have referred will be amicably

settled without resort to the stupid and unspeakably cruel method of a strike. But should there be a cessation of the supply of coal, this Company is in a position to bear the strain for a longer time than the strike is likely to last. Nearly 60 per cent. of the coal needed for the year 1912-13 is purchased at a small increase over the amount of the current contracts; and our supply of oil for the year 1913 is also secured. In case of necessity, the Company could give a supply of oil gas without needing the use of coal, for many weeks. This would not be a unique experience on our part; inasmuch as we, some years ago, supplied oil gas only to the district for about a fortnight, with, so far as I am aware, entire satisfaction to our consumers.

AN INTERESTING INVESTIGATION.

The Secretary advises me that there are indications that the depression which has been noticeable in certain parts of the Company's district during the last two or three years is passing, and that the empty houses are filling up. For example, at the end of 1910 there were 4724 houses empty or not using gas. At the same date in 1911, the number was reduced to 4373, or 7½ per cent. There is also more building going on. Piping has been installed in 16 per cent. more houses in 1911 than in 1910. An interesting inspection has been made during the past year. It was undertaken chiefly to ascertain the safety and condition of coin-meter installations in empty houses, and to see that no illicit connection of gas had been made. Up to the end of the year, 170 streets containing 10,970 houses had been examined. The result was that in 26 per cent. of the houses, ordinary meters were connected, coin meters were fixed in 66 per cent., 5 per cent. were unoccupied, but supplied with meters, and only in 3 per cent. were there no services laid. There were 27 consumers of electricity; and of these 25 were using gas for cooking and heating. In explanation of this fact, I may mention that the streets investigated contained private houses almost exclusively. Over the whole area, there has been an increase in the consumption per meter. Ordinary meters have passed more, on the average, by 18 per cent., and the coin meters by 1·27 per cent.; the actual consumption being in the latter case 15,186 cubic feet. Considering what the weather was during the year, it is satisfactory to be able to record an average increase at all. It is remarkable to find how nearly some figures with regard to coin meters approximate year by year. Removals were exactly 38 per cent. of consumers in both 1910 and 1911. The cash stolen from meters was also exactly the same, 0·2 per cent. The cost of collection again was precisely the same in both years, 0·93d. per 1000 cubic feet sold.

COIN-COUNTING MACHINES.

A change has been made in the system of counting the coins received from prepayment meters, which has resulted in materially reducing the labour, and a reduction in the cost of wrappers from £88 to £26. The coins passed through these machines during 1911 represented £77,213, or 18,531,120 pennies. It speaks well for the accuracy of the machines and the care of the counters, that we have not had a single claim from the Bank for shortage during the year, though 308,850 packets have been paid in. I am glad to say that there is a reduction of 67 in the number of robberies from prepayment meters.

RELATION OF INTEREST AND DIVIDEND AND METER, STOVE, AND FITTINGS RENTALS.

The Secretary gives me another interesting statement deduced from the accounts. Five years ago the charge for interest and dividends was £16,000, while rental from meters, stoves, and fittings was £10,680, or 70 per cent. In 1911, the cost of interest and dividends had grown to £20,460, while the rental of meters and stoves, &c., was £19,120, or 93 5 per cent. By the end of this year, these receipts for rents will exceed the whole of the capital charges. I have just a word to say with regard to the Insurance Bill. At the present time, the Company's contributions to the workmen's provident fund, apart from superannuations, which have so far been paid by the Company through that fund, have been about £70 per annum. Under the Insurance Bill, it will amount to about £450. The extra charge upon revenue will consequently be (say) £380. The Act deals not only with those who are already members of Provident Societies and those in regular work, but with a vast number who are neither the one nor the other. Even in our own Company, out of a total of 700 employed, there are 500 who are not members of the Society. This is partly accounted for by improvidence on the part of the men, but largely because of the Societies' rules as to age and health. All these will now be provided for; and I feel sure that none of us will regret the additional expenditure—saving, as it will, a considerably increased number of families from the distress attendant upon the breakdown of the breadwinner.

The CHAIRMAN then formally proposed the resolution for the adoption of the report and accounts; and, in doing so, remarked that he need only say he congratulated the proprietors heartily on the position and prospects of the Company, which were better to-day than he had ever known them during the long period he had been connected with it.

Mr. HENRY BAILEY, in seconding the motion, said the accounts were the best he had ever seen during his association with the Company. They were so good that the difficulty would be to keep them up in the future. However, if every man in the Company's service would do his best, then they would have no fear in the future. The men, he understood, had worked well during the past half year; and he hoped they would continue to do as they had done, if not rather better.

The motion was unanimously carried.

The DEPUTY-CHAIRMAN (Sir Daniel F. Goddard, M.P.) moved the declaration of dividends at the rate of 7⅛ per cent. per annum on the "A" stock and 5⅝ per cent. per annum on the "B" stock. He remarked that this was a resolution that needed few words to commend it to the approval and support of the proprietors. The words that had come from the Chairman in regard to the position and prospects of the undertaking had been so full and so encouraging that really, in this respect, nothing need be added. He thought the proprietors might look with confidence to the future—not merely because the undertaking was in thoroughly good order, but because he believed the necessity for the use of gas for domestic purposes would continue to grow. He read in a paper the other day that (this was given on the authority of the "Lancet") 76,050 tons of soot fell annually in London as the result of the present barbarous method of burning coal, and that the larger proportion of this soot came from ordinary house chimneys. He (Sir Daniel) was not prepared to support this statement absolutely without further verification; but that a very large quantity of soot did fall was undoubtedly true. They did know that the smoke nuisance was a crying evil, and a really serious problem in all large towns and cities. And they believed as gas makers they held the best remedy for the evil in their own hands; and they looked to this as one of the most hopeful signs of their prosperity—that they could meet this great evil in the best possible way.

Mr. JAMES CLOUDSLEY, J.P., seconded the motion.

The CHAIRMAN: The public spirit of Sir Daniel Goddard is shown in the fact that, as we cure the smoke nuisance of our towns, we diminish the prospects of fogs, which are supposed to be somewhat to the advantage of companies like our own. [Laughter.]

A SPECIAL VOTE—AN ANNIVERSARY COINCIDENCE.

Mr. H. D. ELLIS moved a vote of thanks to the Chairman and Directors, Auditors, officers, staff, and workmen. He said he knew the motion would be received with the utmost enthusiasm. He should like first of all to ask the proprietors to pass a special vote of thanks to their respected Chairman, for, though he unhappily had not fully recovered from the indisposition from which he had lately been suffering, his devotion to the Company was such that, even in this inclement weather, he was here at the post of duty. The proprietors all appreciated this. "It is just like him, gentlemen." As to the accounts, they were very fine indeed. It was true the Company had a fine district with very great potentialities; but in order to develop these potentialities, to bring them to full fructification, able, statesmanlike, and scientific administration was required. The results they had before them, of which they were proud, were largely owing to the ability and devotion of the Board of Directors. The revenue account showed a large balance, although, from a hasty calculation, he gathered that something like 11d. per 1000 cubic feet of gas sold had been expended on wear and tear, or upkeep and renewals of works. To be able to show such a balance, despite so large a devotion of profits to wear and tear and renewals, was something of which to be proud. Then, again, the judicious husbanding of their capital, it had been many times stated in that room, was a most important matter. This was exemplified by the fact that, excluding the debenture charges for interest, the dividend on the capital was something less than 5d. per 1000 cubic feet. This was an extraordinary figure. The accounts, in fact, bristled with extraordinary figures. In speaking of the services of the officers, he said he desired to mention the interesting fact that this was the anniversary of the birthday of their Engineer (Mr. A. E. Broadberry); and they all wished him many happy returns of the day, and that he might live many years in their service. But it was a remarkable coincidence that this was also the thirty-third anniversary of his joining the Company. Therefore he thought Mr. Broadberry was to be congratulated upon having been born into the world and launched into the Company on the same date, in different years. The Secretary they also heartily included in the vote. And they did not forget the staff and workmen employees. The administration and work of the Company were one harmonious whole.

Mr. MITCHELL seconded the motion; and, in doing so, said he should like to say how thankful the proprietors were the Chairman was better than he had been. Their earnest hope was that he would long be spared to preside over the destinies of the Company.

The motion was heartily carried.

The DEPUTY-CHAIRMAN, on behalf of the Board, thanked the mover and seconder of the vote, and the proprietors generally for their hearty acquiescence in it.

Mr. BROADBERRY, replying for the engineering staff and workmen, said he should like to say that he was very proud at having been in the service of the Company, as Mr. Ellis had mentioned, for 33 years, during which time the Company had flourished so abundantly.

Mr. TOPLEY also briefly acknowledged the vote; and the proceedings terminated.

Whitworth Vale Gas Company's Increased Dividend.—The half-yearly balance-sheet of the Whitworth Vale Gas Company, Limited, shows a profit of £1071, and a disposable balance of £1553. The Directors recommend the payment of a 10 per cent. dividend on the original shares, and 7½ per cent. on the "B" shares. Last year the dividends were 8 per cent. on the original shares and 7½ per cent. on the "B" shares. It is six years since the last 10 per cent. dividend was paid.

Ribchester Water Supply.—The new water supply for Ribchester, provided by the Preston Rural District Council, has just been completed, and the service turned on from the top reservoir above Tootel Heights, one of the first reservoirs built by the Preston Corporation. The main is tapped with a 6-inch pipe, reduced nearer Ribchester to 4 inches; and there is also a 3-inch branch pipe. It has been necessary to put in a reducing valve, as the pressure was no less than 180 lbs. per square inch at the reservoir, and if continued to Ribchester it would have been raised to 240 lbs. The valve, however, effects a reduction to about 90 lbs.

Disley and its Gas Supply.—The Disley Council representatives have come to terms with the New Mills Council as to the price to be charged by the latter for gas supplied to that portion of the township of Disley not included in the Chapel and Whaley Bridge Gas Company's area. The New Mills Council are to extend their mains to Disley at an estimated cost of some £4150; and, as stated in a recent issue of the "JOURNAL," proposed to charge Disley 3s. 3d. per 1000 cubic feet, or 9d. more than is paid by consumers in New Mills. At a conference between representatives of the two authorities, it was agreed that, while the annual consumption at Disley is under 8½ million cubic feet, including the property already supplied in Buxton Road, the differential rate shall be 9d. per 1000 cubic feet; up to 10½ millions, 7d.; up to 12½ millions, 5d.; and over this quantity, 3d. The Local Government Board may be asked to arbitrate at the end of ten years as to a further reduction of 2d.

SOUTH SUBURBAN GAS COMPANY.

Annexation of the Bromley and Crays and West Kent Companies.

The Ordinary Half-Yearly General Meeting of the Company was held on Friday last, at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Charles M. Ohren) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

THE LATE MR. ROBERT MORTON.

The CHAIRMAN, in moving the adoption of the report and accounts, said his remarks would, with the proprietors' permission, be briefer than usual, because there were other important matters to occupy their time. He desired in the first place to refer to the great loss they had sustained—the Company had sustained—in the death of Mr. Robert Morton. Mr. Morton had been a Director of the Company for a good many years, was Deputy-Chairman for seven years, and for a short time occupied the chair in succession to Sir George Livesey. In all these capacities, he rendered exceptional service to the Company by the soundness of his judgment, his rare discretion, and his ripe and wide experience. He was, as was well known, a whole-hearted co-partner, and the employees of all grades had lost in him a good and a true friend. His last official act in connection with the Company was at the formal opening of the Livesey Memorial Hall, when, notwithstanding physical weakness, he said a few words of encouragement and of gratification at the completion of the memorial to his almost life-long friend. If he (the Chairman) might be allowed to add a word of purely personal tribute to the memory of a very old friend, it would be that the few years during which he served with him, more than forty years ago, had always dwelt in his memory as having been spent under the influence of a good man, who conscientiously endeavoured to deal justly with all around him. It was not proposed for the present to fill up the vacancy on the Board, because provision was made in the Bromley and Crays agreement for the appointment of a temporary Director in the person of the Chairman of that Company (Mr. Alexander Dickson). Meantime—though it was a small matter to mention—the fees payable to a sixth Director were being saved to the Company.

COAL SUPPLY AND LABOUR TROUBLES.

As mentioned in the report, the labour troubles of the last few months had their effect upon the operations of the Company in the shape of a partial stoppage of the coal supplies. He need hardly say that this had caused considerable anxiety. Their Engineer (Mr. Shoubridge) had been unremitting in his endeavour to secure fulfilment of the contracts; and the Board felt that acknowledgment was also due to the principal contractors for having done their best under circumstances over which they had practically no control. In order, however, to maintain the security of the Company's position, they had to incur additional expense in getting supplies from other sources, which expense had been borne by the revenue for the half year. The anxiety of the Board in this respect was not yet at an end; but they shared the general relief at the improved prospect of a peaceful settlement of the matters at present in dispute between the coal owners and miners.

CO-PARTNERSHIP.

In the meantime, and having regard to the labour unrest in other industries, of which so much had lately been heard, it was with much satisfaction that the Directors were able to report the continued smooth working of the co-partnership system, one of the good effects of which had been to increase, in a marked degree, the intelligent interest on the part of the employees of all grades in the success of the Company's operations. The spirit of co-partnership was, in fact, manifest in the accounts before the proprietors. Sir George Livesey was always of the opinion that considerable monetary value attached to the good-will of employees; and this value was now being reaped in the shape of better carbonizing results, reduction of working costs, and zealous attention to the requirements of consumers. In return, the employees derived substantial benefit from the annual bonus to which they were entitled under the scheme. The amount of this bonus, which was a percentage on their annual earnings, depended, as the proprietors were aware, upon the price charged for gas—that was to say, that, for every 1d. per 1000 cubic feet reduction or increase of price, the bonus was increased or decreased by ½ per cent. This year, in consequence of the reduction of 1d. in price made last year, the bonus would be at the increased rate of 7 per cent.; and, as would be seen by the accounts, it amounted in the aggregate to a considerable sum. He should like to make it quite clear that this bonus was an absolute addition to the ordinary earnings of the employees, and was never considered in any shape or form when fixing either the salaries or the wages; these being advanced from time to time according to circumstances, so as to always ensure payment of full current rates. The total amount credited to the employees by way of bonus down to June 30 last year, since the adoption of the scheme in 1894, was £40,455, and co-partners then held between them nearly £30,000 of the Company's stock, the present value of which was just under £36,000, in addition to having on deposit with the Company nearly £7000. These figures were exclusive of the current year's bonus, which would be divisible on June 30 next, and was estimated at about £4000.

TRADING RESULTS.

As would be noted in the report, there had been a good increase in the sales of gas, chiefly due to the consumption at the Festival of Empire Exhibition. Apart from this, however, it was satisfactory to know that they had more than held their own. Proprietors would have seen from the report that arrangements had already been made for a continuance this year of the use of the Company's gas-engines at the Crystal Palace, and that it is also expected that the high-pressure gas lighting, which formed a very attractive feature of the exhibition last year, would be continued. Resulting from the increased consumption, the receipts for gas exceeded those for the corresponding half of the previous year, notwithstanding the reduction of 1d. per 1000 cubic feet which took effect from July 1 last. Residuals again showed a substantial increase, due for the most part to an increase in the quantity of coal used, but partly also to better prices for tar and sulphate of ammonia, and to the improved working to which he had already referred. It was very pleasing to the Directors to be able to submit so satisfactory a statement as to the position of the Company, especially so as this justified them in recommending an increase of 3s. 4d. per cent. per annum in the dividend, which, at £5 16s. 8d. per cent., would be the highest ever paid by the Company, while at the same time the carry-forward would be increased by about £2000.

THE AMALGAMATIONS.

The agreements with the Bromley and Crays and West Kent Gas Companies would come before the meeting in the shape of separate resolutions for their adoption; and he should then have the pleasure of explaining their provisions. Let him say, however, here and now, that the Directors had given very full and careful consideration to all the matters involved in these agreements; and they were satisfied that the policy which they recommended was in the public interest, as making for further reduction in the price of gas, which was also in the interest of both the proprietors and co-partners.

Sir FORTESCUE FLANNERY, M.P., seconded the motion, and it was unanimously carried.

The CHAIRMAN moved, and Mr. GEORGE ROSS seconded, the declaration of dividends for the half year to Dec. 31 at the rates per annum of 5 per cent. on the preference stock, and £5 16s. 8d. per cent. on the ordinary stock, less income-tax.

This was agreed to.

The CHAIRMAN proposed the re-election of Mr. JABEZ LIGHT (the Deputy-Chairman) as a Director. He observed that Mr. Light was an old and distinguished railway man; and when he (the Chairman) said this, he was sure the proprietors would understand the services of Mr. Light on the Board were of the greatest use to the Company—not only from his special knowledge of railway work, but also from his capacity as a business man.

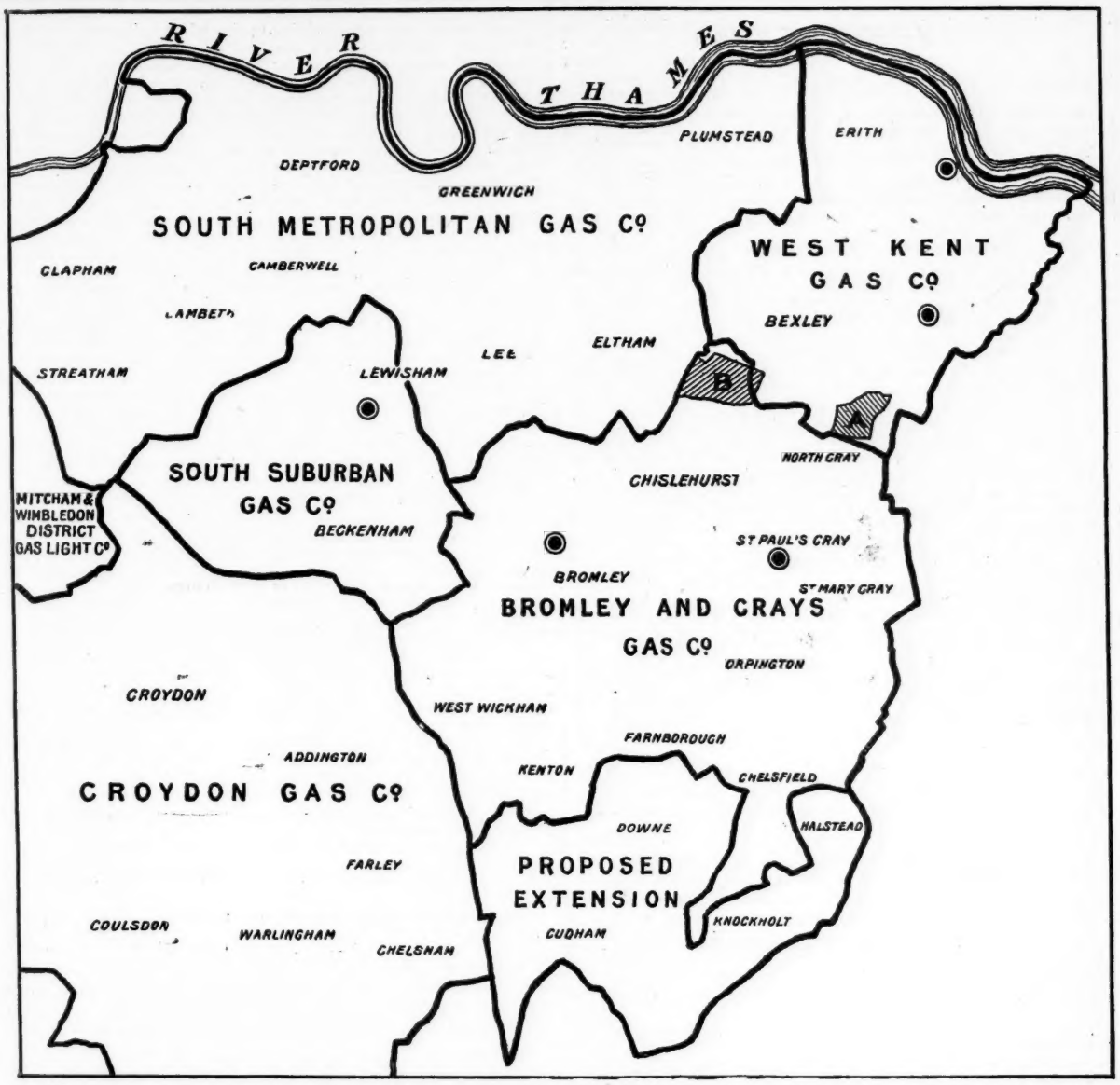
Mr. JOHN BORASTON cordially seconded the motion, which was heartily passed.

Mr. LIGHT having acknowledged the confidence of the proprietors,

On the proposition of Mr. T. P. FISHER, seconded by Mr. CHARLES BEADLE (the Chairman of the West Kent Gas Company), the retiring Auditor, Mr. Samuel Wood, F.C.A., was re-appointed.

Agreement with the Bromley and Crays Gas Company.

The CHAIRMAN moved—"That the agreement, dated the 11th day of November, 1911, and made between this Company, of the one part, and the Bromley and Crays Gas Company, of the other part, for the acquisition by this Company of the undertaking of the Bromley and Crays Gas Company, be and is hereby approved." He remarked that the cartoon which hung upon the wall of the room [see map published with this report] showed the several areas occupied by the three Companies affected by the Bill. The South Suburban Company distributed within their comparatively small area nearly 1500 million cubic feet per annum; while in the larger and only partly-filled areas of the Bromley and West Kent Companies were distributed the comparatively small quantities of 400 and 75 millions or thereabouts respectively. It was apparent from these figures where increase of consumption was most likely to take place, although much must depend upon the trend of population, which varied from time to time, and was subject to railway facilities and other circumstances. Independently of this, however, there was the possibility of securing more gas consumption by working these two areas at lower prices; and the Directors attached considerable importance to the economies both in administration and working which would be rendered possible by uniting the three undertakings under one management. Accordingly, when an opportunity occurred last autumn to open up negotiations with their friends the Bromley and Crays Gas Company, they readily availed themselves of it, and were very courteously met by the Chairman of the Company (Mr. Alexander Dickson) and his colleagues. They at once recognized the great importance of the subject from a public point of view; and after long and careful consideration, they were able to frame the proposals which, as embodied in the agreement, were now submitted, with the utmost confidence, for the approval of the proprietors. The Bromley and Crays Company might be described as a prosperous undertaking, having a steady, though by no means rapid, increase in gas consumption. It laboured, however, under the disadvantage, as compared with the South Suburban Company, of having a rather heavy weight of capital in proportion to its business. This had necessitated for some time past a price of 3s. per 1000 cubic feet, or 8d. more than that of their own Company, with a temporary addition of 6d. in the Crays area. The Company were, moreover, prevented by their Act of 1908, by which they became amalgamated with the Crays Company, from paying the full dividends to which they were entitled under their sliding-scale provisions, till the Crays differential price of 6d. was reduced to 3d., which reduction was to take effect in 1913. Now, having gone very carefully through the accounts of the Bromley Gas Company, the Directors thought that the prospects justified the following proposals. They proposed to ask Parliament to allow the reduction of 3d. in the Crays area to be anticipated by one year, so as to take effect as from July 1 next, instead of as from July 1, 1913. It was further proposed to reduce the price of gas from that date in both the Bromley and Crays areas by 2d. per 1000 cubic feet. This would bring down the Bromley price to 2s. 10d., or 6d. more than the present South Suburban price; but as the Directors saw their way to reduce this by 1d. on July 1 next, as was foreshadowed by him (the Chairman) when last he had the honour of addressing the proprietors, the difference between the two prices when the amalgamation took effect would be 7d., instead of 8d. as at present. These reductions in the Bromley and Crays area could be met, according to their estimate, out of the potentialities of that Company, which the Board considered would also provide sufficient to give the Company's proprietors, not the full dividend to which they were entitled, but still the substantial increase of 10s. per cent. per annum, *plus* 3s. 4d. per cent., consequent



MAP SHOWING THE AREAS OF THE SOUTH SUBURBAN, THE BROMLEY AND CRAYS, AND THE WEST KENT GAS COMPANIES (WITH EXTENSION) WHICH IT IS PROPOSED TO AMALGAMATE.

[The small portion of the area marked "A" belongs to the Bromley Company, but is supplied under agreement by the West Kent Company; the small portion marked "B" belongs to the West Kent Company, but is supplied under agreement by the Bromley Company. The circles denote the positions of the three Companies' existing works.]

upon the proposed reduction of 1d. in the South Suburban area, and coupled, as a matter of course, with participation in any future increase of dividend resulting from a reduction of price by the united undertaking. In order to bring this about, every Bromley and Crays proprietor would receive in exchange for his present holding of "A," "B," or "C" ordinary stock, each bearing a different rate of dividend, the equivalent in South Suburban ordinary stock to bring him in the same income as he was now receiving, *plus* the agreed increase. To ensure complete uniformity, it was necessary to substitute the South Suburban modern standard price of 2s. 9d. for the existing Bromley and Crays standard price of 4s. 6d., subject to a differential price of 7d. Now, whatever difference of opinion there might be as to differential prices, he thought that, if ever there was a clear case for one, it was this. A differential price was generally an estimate, more or less rough-and-ready, of what was believed to be the extra cost of supplying some outlying district. This, however, was not an estimate, but a statement of fact, since it represented nearly enough the actual difference between the capital charges of the two Companies, without taking into account the greater cost of manufacture to the smaller than to the larger undertaking. Were the price to be at once equalized throughout the two areas, an addition would have to be made in the South Surburban area of 1½d. per 1000 cubic feet, which was not for a moment to be thought of. The Directors' endeavour had been to deal justly in this matter as between the two Companies' areas, so that they might come together on terms of practical proportional equality. He need hardly say that the Directors would be quite ready, at the proper time and place, to justify their proposal. It was intended to compensate the Directors and Auditors for loss of office on what might be described as the usual terms. In this connection, he was very glad to be able to refer to the arrangement by which Mr. Dickson, the Chairman of the Bromley and Crays Company, would occupy a temporary seat on their Board. The Directors all felt quite satisfied, from their recent experience of Mr. Dickson, that his services would be of the greatest value to the united undertaking, and anticipated with pleasure his co-operation in giving it a good start. The agreement contained also the usual provision for compensation to any officials whose services might not be required; and, although not expressed in the agreement, it was further arranged that all officials and employees taken over would count their years of service as service with the South Suburban Company, for the purpose of joining the superannuation fund—without cost to themselves for arrears of contributions to the fund. The desire and intention of the Board were, in fact, to treat the employees of this Company from the very first day of their being taken over as on the same footing as their existing employees; and it was scarcely possible they could wish for better treatment.

Mr. CHARLES CARPENTER seconded the motion, which was unanimously passed.

Agreement with the West Kent Company.

The CHAIRMAN next moved—"That the agreement, dated the 15th day of December, 1911, and made between this Company, of the one part, and the West Kent Gas Company, of the other part, for the acquisition by this Company of the undertaking of the West Kent Gas Company, be and is hereby approved." He said, in proposing the adoption of the West Kent agreement, he might say that what he had already said as to the courteous attitude of Mr. Dickson and his colleagues applied equally to Mr. Charles Beadle, the Chairman of the West Kent Gas Company, and his colleagues. He and they recognized from the very first the possible advantages of amalgamation—not only to the public, but also to their own shareholders; and this recognition considerably lightened the task of negotiation. The Bromley Company having brought the South Suburban Company one step nearer to the river, the West Kent Company brought them to the river itself, where they had an excellent frontage with land available for extensions; and he (the Chairman) need hardly point out the advantage of this in regard to the delivery of coal. The district was capable of considerable development; but the works required reconstruction, which it was obvious could be carried out with greater advantage both as regards capital cost and ultimate economy of manufacture on a scale suitable to the requirements of the united Company than by the West Kent Company with its comparatively small output. It was therefore anticipated that in the course of a few years, working costs would be

considerably reduced. The Company was a maximum dividend one, working under an Act of Parliament which dated as far back as 1867, and was not subject to the auction clauses. The capital consisted of £50,000 10 per cent. and £100,000 7 per cent. shares, of which the whole of the 10 per cent. was paid up, and £25,000 of the 7 per cent. would be paid up by June 30 next. It was proposed to convert all the paid-up capital into 5 per cent. South Suburban ordinary stock, to be designated "West Kent," and not to be subject to any reduction of dividend so long as the price of gas in the present South Suburban area did not exceed 2s. 9d., but entitled to 3s. 4d. per cent. per annum increase of dividend for every 1d. reduction below the present price of 2s. 4d. It followed that, when the price was reduced, as intended, to 2s. 3d. on July 1 next, this West Kent ordinary stock would become entitled to a dividend of £5 3s. 4d. per cent. per annum. There was no provision in the agreement relating to the price to be hereafter charged for gas in their area; but it was proposed by the Bill to immediately reduce this from its present high figure of 4s. 3d. to 4s. per 1000 cubic feet, and to make a further reduction of 7d. in five years' time, when it was expected that not only would the reconstruction of the works have been completed, but also that considerable development of the district would have taken place. It was also proposed that there should be another reduction of 7d. in ten years' time from now, so as to bring the price in the West Kent area down to that in the Bromley area; while, as a matter of course, they would, in addition, participate in any reductions that might be made below the South Suburban price of 2s. 3d. That was to say, whenever a reduction took place in the South Suburban and Bromley and Crays areas, the West Kent area would be equally affected—the two reductions of 7d. each being in addition to such reductions. There was the same provision in this agreement as in the Bromley and Crays agreement for compensation to Directors and Auditors, and also to officers whose services might not be required; and what he (the Chairman) had already said in regard to employees applied equally to both Companies.

Mr. CHARLES CARPENTER seconded the motion.

Mr. H. D. ELLIS inquired what was denoted by the small portion of the West Kent district coloured pink on the map [see A] and the small portion of the Bromley area coloured yellow [see B].

The CHAIRMAN replied that A was part of the Bromley and Crays area which was lighted by the West Kent Company, and B was part of the West Kent area which was lighted by the Bromley and Crays Company—both by agreement, which had lasted several years.

Mr. ELLIS: All distinction will now be extinguished.

The CHAIRMAN: Yes.

The South Suburban Bill.

The meeting was then resolved into an extraordinary one, for the purpose of considering the Bill, now before Parliament, intituled "A Bill to authorize the acquisition by the South Suburban Gas Company of the undertakings of the Bromley and Crays Gas Company and the West Kent Gas Company; to confer further powers on the South Suburban Gas Company; and for other purposes."

The SOLICITOR (Mr. C. F. T. Blyth) explained the provisions of the Bill.

Mr. READ CLARK said he took it the clause relating to the compensation of the Directors did not include pensions to these gentlemen.

The SOLICITOR: The compensation is a lump sum.

The CHAIRMAN moved—"That the Bill now submitted to the meeting, intituled 'A Bill to authorize the acquisition by the South Suburban Gas Company of the undertakings of the Bromley and Crays Gas Company and the West Kent Gas Company; to confer further powers on the South Suburban Gas Company; and for other purposes,' be approved, and that the Directors be authorized to proceed with the same, subject to such additions, alterations, and variations as Parliament may think fit to make therein and the Directors approve." He said there were a few additional provisions in the Bill not relating specially to the acquisition of the two undertakings, but having for their object the making of their proceedings uniform throughout the proposed new area, and the adoption of modern legislation. It would not be necessary for him to take up time in referring to these at length.

Sir FORTESCUE FLANNERY said he hoped, in seconding the resolution, he should not be expected to go seriatim through the 43 clauses of the Bill, as his friend, Mr. Blyth, had done. On the other hand, he did not think it would be altogether respectful if he did not say a word on behalf of the other members of the Board in support of the Chairman in commending to the proprietors and the public the general features of the large and important change that the proprietors were asked to sanction in connection with their undertaking. The great object they had was the union of three undertakings and three areas—believing as the Board did that "in union is strength," and that every one of the interests concerned would be benefited by the amalgamation if it were ultimately sanctioned by Parliament, as he felt certain it would be sanctioned by the proprietors that day. If the proprietors looked on the map which had been so often referred to during the proceedings, they would see that the South Suburban area was much smaller than the area of the Bromley Gas Company; but their population was much denser than the others. The territory of the Bromley Gas Company included large country districts which at present were not supplied by gas; and the Directors believed, with the modern improvements, and with the manner of making and supplying gas which the South Suburban Company possessed, they would be able so to develop these areas that they would be in the position of supplying in the near future very large quantities of gas there. Even the West Kent Company's area, adjoining the river as it did, differed a good deal from the Bromley area—that was to say, the West Kent area, having the advantage of river carriage and river frontage, had a denser population than the Bromley area. But the Gas Company there had, from various causes, not been able to take full advantage of their locality. He (Sir Fortescue) was not for a moment suggesting any blame to them. He was sure that his friend, Mr. Charles Beadle, quite understood this. As a matter of fact, from various causes, they had not had the full advantage of the opportunities which the South Suburban Company hoped to be able to take when they were working on so much larger a scale. The Directors were not proposing to give 9d. for 4d. as was customary elsewhere [Laughter]; but they did believe they would give real advantage, in reductions in price, to the gas consumers, in wages and bonus to the workers, in dividends to the shareholders, and larger local trade, and therefore more prosperity for the tradespeople and others in the districts concerned. The Directors believed these were the advantages, practically speaking, which this great amalgamation would bring about. So with the whole-hearted belief that they were putting forward something which was for the benefit of the proprietors, and when the proprietors accepted it they would be putting forward something which was for the benefit of the public and the workers generally, the Directors commended the scheme to the acceptance of those present. Before he sat down, he should like to say one word of appreciation, which he thought ought to come from him on behalf of his colleagues, of the efforts which their Chairman, Mr. Hunt, had made in bringing about these amalgamations, and in overcoming the detailed difficulties of negotiation. The whole of the interviews with the representatives of the other two Companies had been carried out by the Chairman, with the assistance of the officers of the Company. His colleagues had been content to leave this burden upon Mr. Hunt, as he was content to assume it; and the result had been very satisfactory indeed, as they believed, to all concerned. They had sought no advantage from the other Companies; and they had got no unfair advantage. They believed they had made a fair bargain all round. The Board most thoroughly appreciated, and they wanted the proprietors to appreciate, the special burden the Chairman had undertaken, and which he had carried out with the utmost possible success.

The resolution was unanimously carried.

The CHAIRMAN proposed a hearty vote of thanks to the officers, staff, and the employees for their exertions on behalf of the Company. The Board felt they were very largely in the hands of the officers and employees; and he moved this vote of thanks in no formal spirit. He believed they were all deserving of their thanks. He especially mentioned Mr. Shoubridge and Mr. Ohren.

Mr. W. T. WILKINS seconded the motion, which was carried.

Mr. CHARLES BEADLE proposed a vote of thanks to the Chairman and Directors; and, in doing so, he acknowledged the courtesy the West Kent Company's Directors had received from Mr. Hunt and his fellow Directors. He believed the scheme was for the benefit of the consumers; and that everyone would be fully satisfied with what had taken place.

Dr. SIDNEY TURNER seconded the motion, specially referring to the proprietors' recognition of the immense amount of anxious work the Board had had in bringing about the amalgamation. He firmly believed they had done the right thing.

The CHAIRMAN, Mr. SHOUBRIDGE, and Mr. OHREN replied; and the proceedings terminated.

BROMLEY AND CRAYS GAS COMPANY.

The Proposed Amalgamation with the South Suburban Company.

The Ordinary Half-Yearly Meeting of the Bromley and Crays Gas Company was held at the Bell Hotel, Bromley, last Thursday—Mr. ALEXANDER DICKSON (the Chairman) presiding. The meeting was one of unusual importance, as the proposed amalgamation of the Company with the South Suburban Gas Company was explained at length by the Chairman.

The ACTING-SECRETARY (Mr. G. Wicks) having read the notice convening the meeting, the report and accounts for the half year ended Dec. 31 were presented. The accounts showed that the revenue from the sale of gas amounted to £32,405; residuals produced £6985; and the total receipts were £43,050. The expenditure having been £30,432, there was a balance of £12,618 to go to the profit and loss account. The sum available for distribution was £14,088.

The CHAIRMAN said the proprietors were assembled under circumstances of unprecedented interest, as the present might be the last general meeting of the Company. The report and accounts before them confirmed the soundness and stability of the undertaking. Comparison of the returns for the second half of 1910 with those of the past half year showed that there had been an increase in the make of gas by 3 million cubic feet, which, if continued regularly, would yield 12 millions increase in one year over its predecessor. Summarizing the results of the six months' working, there was an increased balance of about £1635 in the revenue account; and, after providing for all interest on loans and debenture stock, and for dividends at the same rate as the last, there was the increased balance of profits of £4827 to carry forward. He moved the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Colonel Bertram H. Latter) seconded the motion; and it was carried.

A proposal to make a further payment of £145 to the Executors of the late Secretary of the Company (Mr. H. W. Amos) was then submitted to the meeting; and, after some discussion, it was decided *nem. con.* to increase the grant to the total sum of £500, of which 100 guineas had been already paid.

The CHAIRMAN then proposed the declaration of dividends, under the sliding-scale, at the rates of 6 per cent. per annum on the "A" stock, of 4½ per cent. per annum on the "B" stock, and of 5½ per cent. per annum on the "C" stock—all subject to income-tax. This would absorb £9260, and leave £4827 to be carried forward.

Mr. GEDGE seconded the proposition, which was carried.

The three retiring Directors and one Auditor were unanimously re-elected.

This completed the business of the ordinary meeting.

Details of the Amalgamation Scheme.

The question of the proposed amalgamation with the South Suburban Gas Company then came before the meeting.

The CHAIRMAN, in the course of a comprehensive survey of the position of the two Companies, said the negotiations in respect of the amalgamation were opened by the South Suburban Company last

autumn; and upon receipt of their letter his colleagues empowered him to meet the Chairman of the Company to learn their views. As the result of their deliberations, it transpired that the Company desired to amalgamate on purchase; and that if the proposal were accepted, a further amalgamation with the West Kent Gas Company was probable, which would take their extended area to the banks of the Thames, with all the attendant possible advantages derived by the other larger London Companies having their own landing-stages. It also transpired that it could be agreed that if the amalgamation were effected, the price of gas in the Bromley area should be reduced at once 2d. per 1000 cubic feet—*i.e.*, from 3s. to 2s. 10d., and that in the Crays area the 3d. per 1000 feet reduction required by the Act to be conceded in that area at Midsummer, 1913, should be made at Midsummer next, with, in addition, a further reduction at Midsummer of 2d. per 1000 cubic feet in the Bromley area, making an immediate reduction of 5d. per 1000 feet in that section of the district, with another 3d. in 1918. The current price of 2s. 4d. in the South Suburban Company's district would at the same time be reduced to 2s. 3d., with the prospect of further reductions within measurable distance—a neighbouring riverside Company being able to sell their gas at 1s. 10d. per 1000 cubic feet. Lastly, the South Suburban Company were willing to place the stocks of the Bromley Company on a footing of exchange for stock of their own, which, with their price of 2s. 4d. per 1000 cubic feet, would ensure an increase of income of 10s., or ½ per cent., per annum, with the attendant prospects of their sliding-scale, under which, when the price of gas came to be lowered in July to 2s. 3d. per 1000 cubic feet, another 3s. 4d per cent. per annum would accrue in dividend, and similarly for every further penny reduction. With these facts before them, his colleagues and he could not resist the conviction that the best interests of consumers and stockholders alike would be more speedily promoted by the amalgamation of the two or three Companies. Accordingly, the Directors suppressed those motives of self-interest and gratification in the retention of their position as a Board which might naturally have otherwise claimed prominent consideration at their hands. To have passed over such an opportunity of obtaining these immediate and prospective benefits to consumers and stockholders with a greater certainty than the unaided resources of their own Company might have permitted, would have laid the Directors open, as it seemed to them, to an impeachment for dereliction of trust, and would certainly not have enhanced their reputation as a prescient body. For these primary reasons, they made the agreement provisionally, confident of the approval and confirmation of their fellow-stockholders. Nor were they in the least in doubt that their action would be acceptable to the local authorities and other consumers generally throughout the district. In these amalgamations, there were necessarily dissolutions of companies, supersession of the directory boards, displacements of officers, and transfer of services of officers and employees. All these matters had been provided for equitably. Each Director would receive as compensation for loss of office seven years' fees; and each Auditor, three years' fees. All the officers and employees would be taken over; officers deprived of office would receive compensation in a sum to be agreed upon, or settled by arbitration—in no case to be less than the compensations on compulsory retirements allowed under the Superannuation Act to servants of the Crown. All officers and employees were to be admitted to the superannuation fund of the South Suburban Company on the 1st of July next, without having to pay any contributions in respect of previous service; and he might say he was particularly gratified in securing this position for them. There was just one other detail. It was not unusual to include in the Board of the amalgamated Company one or more of the Directors of the purchased undertaking. It was also almost an axiom that a relatively smaller number of members constituted the more efficient and best working board. The South Suburban Company's Board already consisted of six Directors and two Workmen-Directors; and, with a view of meeting the wish expressed for some representation, at least temporarily, the Chairman of the Bromley Company was to be an additional member of the Board for a prescribed period of two years. The debenture stocks and mortgages, with all other liabilities of the Company, would be charged over upon the South Suburban Company. He did not think it necessary to offer any more explanatory observations. He had the agreement there, and after reading it he would answer any questions, and move the resolution for its confirmation. His statement could not, however, be complete did he not record the Directors' sincere appreciation of the courtesy and readiness of Mr. Charles Hunt, the Chairman of the South Suburban Board, and his colleagues, in meeting what was submitted by the Bromley Directors as essential in the recent negotiations.

The agreement having been read,

The CHAIRMAN moved that it be approved.

The DEPUTY-CHAIRMAN seconded the proposal.

Mr. PEILL expressed disagreement with the scheme, and eventually moved, as an amendment, that the consideration of the matter should be adjourned, in order that each shareholder could have a copy of the Bill and agreement.

The CHAIRMAN said Mr. Peill must have forgotten the circular they had issued in November to the whole of the members, as to how their interests were affected. He could assure Mr. Peill that his statement that the proposed amalgamation met with the approval of the large body of the shareholders was perfectly reliable.

There was no seconder to the amendment; and the motion was carried by twenty votes to two.

Mr. BLYTH (Messrs. Blyth, Dutton, Hartley, and Blyth) then read the Bill; and it was approved, subject to such alterations as might be made by Parliament.

At the close of the business,

The CHAIRMAN paid a warm tribute to the Company's Chief Engineer (Mr. William Woodward); saying it would be difficult to find a more successful manager of gas-works in the kingdom.

A vote of thanks was accorded to the Chairman; and the proceedings terminated.

According to the "Financial News" of last Saturday, there is "something moving" in "Coalite," of which more will be heard in the course of a week or two.

CHISLEHURST AND THE GAS AMALGAMATION.

A Special Meeting of the Chislehurst Urban District Council was held on Wednesday evening last to consider the report of the Sub-Committee (Messrs. Straus and May) appointed to attend a conference with representatives of the Bromley Corporation, Beckenham Urban District Council, Foots Cray Urban District Council, and Bromley Rural District Council, held on the 17th ult., at Bromley, as to the South Suburban Gas Bill.

Messrs. Straus and May set forth in their statement that up to June 24 next, the price of gas in the Crays district was to be not more than 6d. or less than 4d. per 1000 cubic feet in excess of the price in the Bromley district. From 1913 until June 24, 1918, the price was to have been not more than 4d. or less than 3d. in excess of that of Bromley. After the year 1918, there was to have been a flat-rate. Under the South Suburban Bill, however, the price would be as follows: In the Bromley gas district, 7d. per 1000 cubic feet above the price in the South Suburban district for all time; in the Crays gas district, until June, 1918, the price was to be 10d. above the South Suburban price, and at all times thereafter 7d. above. The Bromley price was 3s., Crays, 3s. 6d., and South Suburban 2s. 4d. If the Bill became law, the Bromley district would have an immediate reduction of 1d. and the Crays district 4d. But so far as the Sub-Committee could gather, this would be the extent of the reduction in the Bromley district; and neither the Bromley nor Crays district would ever be on terms of equality with the South Suburban district. The price could not be below 2s. 11d. until the price in the South Suburban district was lowered from its present rate of 2s. 4d.—a most unlikely contingency. The majority of those present were of opinion that an attempt should be made to obtain a modification of this clause, and secure the re-enactment of the clauses in the Bromley and Crays Gas Act as to the laying of mains in private streets, &c. The Sub-Committee recommended the lodging of a petition in the House of Lords, the cost of which, including fees, would not exceed £20.

The minutes of the conference itself showed that the Mayor of Bromley made an introductory statement explaining that the Bromley Corporation had decided to oppose the South Suburban Bill, which had been promoted by the South Suburban Gas Company to acquire the undertakings of the Bromley and Crays Gas Company and the West Kent Gas Company. Considerable discussion ensued on various matters in connection with the Bill; and it was resolved that the representatives attending the conference should recommend their respective Councils to oppose the Bill, by separate petitions.

The Sub-Committee's recommendation was adopted; one member voting against.

HIGH-PRESSURE GAS LIGHTING AT SOUTHPORT.

Mr. John Bond, the Gas Engineer to the Southport Corporation, has published in pamphlet form, for the information of members of the Council, a description of the high-pressure gas installation put down for experimental purposes in two of the principal business streets in the town, together with details as to the cost of such lighting when applied for commercial purposes.

It was in April last that the Southport Gas Committee decided to instal high-pressure gas plant at their distributing station in Eastbank Street. Three high-pressure gas-lamps were fixed in London Street as an experiment in public lighting; and two were placed outside the gas offices in Eastbank Street. The latter were each of 500-candle power; while two of the other lamps were of six times this power.

In laying the main, provision was made for extensions to other business thoroughfares. The low-pressure gas is supplied to the compressor from a 10-inch main in Eastbank Street; and by an automatic valve the gas connections to the compressor are so made that, when the plant is not working, the high-pressure mains are supplied with gas under low pressure. The high-pressure lamps already erected for street lighting trials are lighted each evening at dusk and extinguished at half-past eleven, when a small single-burnered low-pressure lamp is utilized for the remainder of the night. At present there is one of these low-pressure lamps attached by a bracket to each high-pressure lamp-pillar; but provision has been made for fixing two to each pillar. The consumption of gas by these all-night lamps is only 5 cubic feet per hour; and they give a light of 100-candle power each. The height of the mantles from the pavement in the case of the high-pressure lamps is about 18 feet; and they are arranged at the exact angle at which the greatest radiation from one lamp to another will result.

Mr. Bond states that a few private firms have already taken advantage of the installation for illuminating their shops from the outside; and it is expected that the number will be considerably increased as shopkeepers realize the many advantages offered by high-pressure gas lighting. The prices charged are reasonable—*i.e.*, 1500-candle power, £4 10s. per annum; 1000-candles, £3 10s.; and 500-candles, £2 10s. These prices include the fixing and the gas consumed; the Corporation undertaking cleaning, maintenance, lighting, and extinguishing. Mr. Bond points out that the use of high-pressure gas for street lighting has made very rapid strides in Berlin, where 37½ miles of streets are at present lighted in this way, and an additional 43½ miles will be so lighted in the near future.

South Suburban Gas Bill.—The Chairman (Mr. C. E. Baker) has reported to the Beckenham Urban District Council that he attended the conference at Bromley of the local authorities interested in the South Suburban Gas Bill; and it was agreed that the various authorities should each present separate petitions. Beckenham was not very largely interested in this matter, as the Bromley and Crays Gas Company only supplied a very small portion of their district; and he suggested that the matter be left to the Clerk and himself to consider and report to the General Purposes Committee, with power to act. This course was agreed to.

SALFORD'S LATEST PROPOSAL.

An Amalgamation Scheme.

The latest move of the Salford Town Council to overcome the difficulty which has arisen between them and the out-districts on the question of gas profits, is to amalgamate with the borough the areas represented by two of the three authorities who, by means of a Bill now before Parliament, seek to compel the former to give effect to the decision of Lord Donoughmore's Committee in 1909 as to the limitation of such profits. On the recommendation of the Parliamentary and Public Trusts Committee, the Salford Town Council, meeting in General Purposes Committee last Wednesday, adopted, with one dissentient, a resolution to the effect that inquiries be made by that Committee "as to the advisability of amalgamating the borough of Eccles and the urban district of Swinton and Pendlebury to the borough of Salford, and to report to the Council." The member who voted against the resolution did so on the ground that the district governed by the Prestwich Urban District Council ought to have been included in the scheme.

The meeting was not open to the Press; but at the conclusion of the proceedings an official report was supplied by Mr. L. C. Evans, the Town Clerk. It was stated that the Mayor (Alderman Linsley), who presided, explained that the Parliamentary Committee of the Council had given very careful consideration to the position which had been created by the action of the Eccles Town Council and the Swinton and Pendlebury Urban District Council, together with the Worsley District Council, in deciding to promote a Bill in Parliament for the purpose of compelling Salford to deal with the gas undertaking, and to require the Corporation to pay for the promotion of that Bill. The object, of course, the Mayor said, was to force Salford to supply gas to Eccles, Swinton, and Pendlebury at what would practically be cost price—leaving Salford with all the risk, trouble, and unpleasantness of running the gas-works. Seeing, therefore, that the out-district authorities were seeking to administer Salford's affairs without taking the corresponding obligations, it was thought by the Parliamentary Committee that the best thing to do was to make inquiries with a view to the out-districts being made complete partners, in order that they might not only enjoy the advantages, but also share the responsibilities. It seemed exceedingly unfair that, considering the out-districts only took about 25 per cent. of the gas manufactured by Salford, they should seek to impose terms as to the working of the undertaking upon those who represented 75 per cent. of the consumers. This was the opinion of the Parliamentary Committee.

The Town Clerk, in reply to a question, said that the Parliamentary Committee gave an undertaking to consult the Council before taking any definite steps in regard to the matter. Inquiries would be made as to the administration of the districts proposed to be amalgamated, and particulars submitted to the Council, to enable members to form a judgment as to the advisability of the suggested amalgamation.

In the event of the Council deciding in favour of the scheme for an extension of the borough to include the districts named, all the information compiled will be laid before the Local Government Board, and that department will be asked to hold an inquiry. The scheme, if adopted, will increase the population of Salford borough from 231,380 to 304,084, and the rateable value from £1,000,000 to £1,250,000.

In the course of an interview on Thursday, Alderman Linsley laid stress on the fact that an arrangement such as was proposed would put an end to the strained position which has existed for many years between Salford and the out-districts, chiefly on the question of the administration of the gas undertaking and the allocation of profits made in that department. He said he thought it would be to the advantage of the outside authorities to join in the scheme. Salford had been supplying them in many directions, and, of course, would take into consideration, on a liberal basis, the question of differential rating. By such an amalgamation as was proposed, Salford would have room for expansion through the avenue of the out-districts. Still, one of the most important points was that it would do away with all the trouble they had experienced during recent years as to the gas undertaking. If the districts concerned wanted to participate in the profits of the Salford gas undertaking, let them come and take their share of the responsibility, and not simply enjoy the advantages.

Inquiries made among the leading men in the Eccles, Swinton, and Pendlebury districts indicate that at present the disposition is to flout Salford's proposal; and the general opinion seems to be that an amicable arrangement is impossible under the circumstances. Mr. W. Scott Forbes, the Mayor of Eccles, said he could not see any advantage that would come to Eccles by amalgamation, except possibly the settlement of the gas question, which had agitated them for a long time. But even this difficulty might not be solved in a way that would be acceptable to the people of Eccles, who had quite made up their minds that the Council were pursuing the right and only reasonable course in proceeding with the Parliamentary Bill.

The Local Government Board and the Dispute.

The Town Clerk of Eccles received last Thursday a long communication from the Local Government Board giving the opinion of the department as to the dispute on the gas question between the out-districts and the Salford Corporation. The letter, after reciting the different points raised in the controversy, states that the Board are of opinion that the points at issue should be dealt with by Provisional Order. They have, therefore, fixed the date of the local inquiry for the 22nd inst., by Mr. E. A. Sandford Fawcett. The Provisional Order will require confirmation by Parliament. This means that there is an appeal from any decision of the Board to Parliament; but on this point the Board say: "It is most desirable that a settlement of the questions which have been so long at issue between the Salford Corporation and the local authorities in the areas outside the borough and within the Corporation limits for the supply of gas should be arrived at without the great expense entailed by a further contest in Parliament." The Board feel sure it would be practicable to arrive at a settlement in the matter which would be satisfactory to all the parties, if the case were considered by them from the point of view of the common interests, and with the desire to come to an arrangement which would be fair both to the Corporation and to the outside areas.

MUNICIPAL EMPLOYEES' WAGES.

The Lancashire branches of the Municipal Employees' Union, encouraged apparently by the success of their experiment at Stalybridge, are pressing their demands upon the local authorities in other towns for the establishment of a minimum wage and improved conditions of working. The Gas Workers' and General Labourers' Union Executive are also moving in the matter in a number of boroughs.

A conference between a Sub-Committee of the Stalybridge Town Council and a deputation from the employees in the Gas, Sanitary, and Highways Departments took place on Thursday night, in accordance with the terms agreed upon when the recent strike was ended, after the town had been in darkness for two nights by the withdrawal of labour at the gas-works. Alderman J. Ridyard, the Mayor, who is also Chairman of the Gas Committee, presided; and the 16 representatives of the men were accompanied by Councillor J. T. Jones, of Manchester, the Divisional Secretary to the Municipal Employees' Union. The meeting, which was not open to the Press, lasted just over two hours. It was stated at the conclusion of the proceedings that, though no definite decision had been arrived at, there was every prospect of an amicable settlement. The Sub-Committee will present a report to the Town Council on the points raised, and make certain recommendations as to wages and conditions. In an interview subsequently, Councillor Jones said that the demands of the men for increased pay and improved conditions of service were favourably received; and he believed that the men's grievances would be remedied.

The demand made by the Oldham Branch of the Employees' Union for the establishment of a minimum wage was considered at a meeting of the Carrying and Cleansing Committee of the Town Council last Wednesday, when a deputation of the men, accompanied by Councillor Jones, attended. A definite decision as to the application of the men was not reached that night. At a special meeting of the Committee held the following evening, however, it was decided to recommend the Council to advance the wages of day carters from 25s. to 26s. per week, and night carters from 27s. to 28s.; also that day labourers be paid 25s. a week instead of 24s., and night labourers 26s. in place of 25s. The Committee did not see their way to concede other demands put forward by the men.

At Thursday's meeting of the Bury Town Council, Mr. Nabb asked what was the ground for the refusal by the Salaries' Committee of an application from the Employees' Union "that no employee of the Bury Town Council be employed under a minimum wage of 25s. per week of 54 hours." The Mayor suggested that it was not worth while discussing the matter; and the minutes were confirmed.

The Gas and Electricity Committee of the Rochdale Corporation, at last Wednesday's meeting, considered applications made for increased pay to men employed at the gas-works. General labourers asked for payment at the rate of 6d. an hour—an advance of ½d. on the present rate; and the whole-time lamplighters demanded an increase by 2s. weekly—those engaged part time seeking an advance by 1s. per week. No action was taken in reference to the application by the general labourers; and as to the whole-time lamplighters, it was pointed out that they were recently granted an increase of 7½d. per week. A proposal to give the part-time lamplighters an advance was defeated. A request from the service men and pipelayers for increased pay was referred to the Works Sub-Committee. In regard to the gas stokers, it was recommended that an advance of 3d. per shift be granted, which will bring the men's wages up to just over £2 a week.

At to-morrow's meeting of the Salford Town Council, a resolution will be moved by Mr. Purcell relating to wages. He proposes that all employees of the Council at present in receipt of less than 40s. a week, regular or casual, shall from the first pay-day in March have their wages advanced by 2s. per week; and that the present minimum of 25s. per week be advanced accordingly. A further resolution will seek to ensure double rates of pay for all those who are called upon to work on Bank Holidays and declared or customary holidays, with time-and-a-half rates for those who work on Saturday afternoons. For overtime, Mr. Purcell proposes that all men be paid at the rate of time-and-a-quarter for the first extra hour, time-and-a-half for the second hour, and double time for all hours worked afterwards. In any case where a workman is called upon to start before the usual time, he suggests that double rates be paid for the time worked prior to the ordinary starting hour. Alderman Jackson has given notice of a resolution to the effect that Corporation workmen shall have a right of appeal to the Committee on being suspended or dismissed by the officials.

In accordance with a resolution adopted at a previous meeting, a return was presented at last Wednesday's sitting of the Blackpool Town Council as to the pay of workmen earning less than 6d. an hour. This report showed that 243 workmen who had been employed by the Corporation more than twelve months, and 65 who had been in their employ for less than a year, came under this head. It was stated that to increase the wages of all Corporation workers to a uniform rate of 6d. per hour would mean an addition of at least £3354 to the annual wage bill. In the absence of Alderman Grime, who had raised the question, the Council decided to refer the whole matter to a Sub-Committee to make further inquiries.

The Lighting of Totnes.—A Committee who had been considering the subject of the lighting of the town presented a report to the Totnes Town Council recommending various small improvements. Some members of the Council suggested that the time had come when incandescent burners should be fitted to all the lamps; and it was suggested that the Surveyor should prepare a report as to the cost. Alderman Hayman said he brought up a similar suggestion when the last contract with the Gas Company was made; but the Lighting Committee objected to doing it then. Alderman Windeath said the explanation was that they did not think the Company were treating them fairly. If they put in a few new lamps, the Company did not charge them any extra; but if they converted the whole of the lamps to the incandescent system, there would be an extra charge. The Council took no action in the matter.

DONCASTER GAS-WORKS EXTENSIONS.

At Thursday's meeting of the Doncaster Town Council, the Gas Committee reported that they had considered an estimate relating to the proposed provision of additional washing and scrubbing plant, purifiers, storage accommodation, and probable extensions of mains in connection with the gas undertaking; and they recommended that same be approved. The estimated cost is £33,000, to cover the next three years.

In moving the adoption of the report, Alderman Armitage (the Chairman of the Gas Committee) said they were going before the Local Government Board to ask for powers to borrow money with a view to extending their works; the sole reason being that these were at present inadequate to the demands made upon them. It was not a contentious matter, or a new scheme, but one they had to take in hand through the growth of the district. Their Engineer (Mr. R. Watson) had gone into the question very carefully, and believed in doing these things by instalments as far as possible. He came to the conclusion some short time ago they would have to put in hand extensions; and he went into the figures, and laid them before the Committee, who had since brought them before the Council in committee. He could give a lot of statistics to show why the work should be done; but the Council were unanimous on the matter, and therefore he would not deal further with it. He hoped the Doncaster Gas-Works would be as successful in future as in the past.

Alderman Spencer said he trusted that, whatever was done in regard to this £33,000, the best efforts would be made by the Manager to let them have as good quality gas as possible. He was rather afraid latterly the gas had not been purified as it ought to have been.

The Committee's recommendations were adopted.

CLONMEL GAS UNDERTAKING.

Extension Scheme—The Gas Managership.

A Local Government Board inquiry was held recently at Clonmel by Mr. P. C. Cowan, with regard to the application by the Corporation for a Provisional Order to enable them to manufacture gas on a piece of land adjoining the present works, and to borrow £7000 for the purpose of extending and improving the gas undertaking. There was no opposition to the proposals, which were explained by Mr. T. F. O'Brien, Solicitor, who said that Mr. Isaac Carr, of Widnes (the Consulting Engineer to the Gas Committee), had recommended the Committee to make alterations and put in up-to-date plant and machinery, which would result in economy. The present price of gas, he said, was 3s. 11d. per 1000 cubic feet for manufacturing purposes, heating, and cooking, and 4s. 9d. for ordinary lighting, with a discount of 5 per cent., and 10 per cent. in certain cases. The Town Clerk (Mr. J. F. O'Brien) stated that the Corporation acquired the concern in 1896; and the price of gas then for all purposes was 5s. per 1000 cubic feet. The works were founded in November, 1824—shortly after gas was introduced for lighting purposes in London. As a matter of fact, the first holder erected in London was at the present time in the Clonmel Gas-Works.

Mr. Carr, in the course of his evidence, said that the existing plant was adequate for the present demand; but it was antiquated and expensive to work. He was satisfied that the proposed changes would result in economy. Last year the make of gas was 28,528,000 cubic feet, and the sales 25,904,000 feet—the leakage being 9·2 per cent. The contemplated work included improved carbonizing plant and further coal storage accommodation. With the new retorts he calculated on a saving of £375 in coke and they would be able to produce 500 cubic feet more gas per ton of coal, which would mean a saving of £158. This would make a total saving of £533, or 20 per cent. on the estimated capital outlay of £2700. The provision of extra storage accommodation for coal would give them far greater security, as they would be safe in the event of disturbances in the labour world. The present storage was from 700 to 800 tons; and it was proposed to increase this by 1250 tons. The Inspector asked what was the charge for gas in Widnes; and Mr. Carr replied: "1s. 1d. and 9d.; and we make a profit at that. In a good year the bye-products pay for the coal; and we have the gas free. I have been there thirty years." Asked whether he had any hope of reducing the price in Clonmel for the consumers, witness said there was a proposal to appoint a new manager; and he was positive that within twelve months the Committee would be in a position to give a further reduction. The undertaking had not been worked under the best or most economical conditions in the past; and under more favourable circumstances in the future, it should do better for everyone concerned.

Subsequently to the inquiry, the Corporation held a special meeting to receive a report of the Gas Committee as to the position of manager, rendered vacant by the resignation of Mr. William Kneeshaw. A proposal to grant Mr. Kneeshaw a superannuation allowance of £120 a year had been approved at a former meeting; but it was explained that, under the Local Officers Superannuation Act, 1869, the Council could not grant superannuation to any officer, unless the grant was confirmed at two meetings of the Council. The proposal was approved; and then the Town Clerk read the report of a meeting of the Gas Committee held that day to select a successor to Mr. Kneeshaw. From this it appeared that the Committee had advertised in both Irish and English papers, and in response had received 84 applications for the position. The advice of Mr. Carr was sought; and finally the name of Mr. Henry Burton, of Stockport, was submitted to the Council for approval. Alderman Morrissey, the Chairman of the Gas Committee, in presenting the report, referred to Mr. Kneeshaw's high character, and said that as this gentleman was 74 years of age he felt he was no longer able to manage the concern—especially in view of the changes that were in contemplation. During the past four years, a sum of £3200 had been handed over in relief of the rates, besides a reduction in the price of gas. It was early in the evening clear that the Committee's report did not meet with unanimous approval; and, as a matter of fact, after a full discussion (the report of which filled some seven columns in the local "Chronicle") the recommendation of the Committee was rejected by 14 votes to 6. At times, one or two of the members "let themselves go" a bit; and the proceedings were, in parts, none too dignified. Glancing through the speeches, one gathers that (in spite of Mr. Carr's advice) some members were of the opinion that the appointment should have been given to Mr. Richard Kneeshaw—the retiring Manager's son; while the mere fact that an Englishman had been selected seemed also to provoke opposition.

GAS v. ELECTRICITY FOR SCHOOL LIGHTING.

A Triumph for Gas at Hereford.

There has been erected at the joint expense of the Hereford City and County Councils a new secondary school which will cost £11,000; and a short time ago the question of the method of lighting it came under the consideration of a Committee of the two bodies. The Electric Lighting Committee of the City Council were very desirous of having the order for the work, and tried their hardest to get it. It was, however, entrusted to the Gas Committee, who are carrying it out under the advice and with the assistance of the Engineer and Manager (Mr. W. W. Townsend) At a recent meeting of the Council, the former Committee, in their report, expressed regret that their efforts had proved unsuccessful; and the chagrin of the Chairman (Mr. E. R. Dymond) was evident from his remarks in the course of the proceedings.

In moving the adoption of the report, Mr. Dymond said the Committee were sorry the school was not to be lighted by electricity, which seemed contrary to the accepted practice of recognized authorities, "and likely to prejudice the health and comfort of those who used the school."

Mr. Moore expressed his personal regret, and, he was sure, the regret of many members of the Council, that the Education Committee had not seen their way to light the school by electricity. The building seemed to be up-to-date in all respects; and excepting that it was to be fitted with gas, the health and comfort of the children appeared to have been considered in every way. Electric light did not smell, and did not make places dirty; and, on these grounds alone, the Education Committee should have tried to see their way to lighting the school not by gas but by electricity.

Mr. Witts said he thought the Joint Committee came to a very wise decision indeed in regard to the lighting of the school by gas, as very questionable methods were adopted with a view to getting the order for lighting it by electricity. With regard to the health and welfare of the children in lighting by electricity instead of gas, scientific opinion was in favour of gas. The secondary school at Birmingham was so lighted after obtaining the highest scientific opinion. They were told, too, that for students electricity was too trying to the eyesight; and he believed this was an accepted fact. He thought the Committee were absolutely unanimous in their decision; and it was a wise one.

Mr. Lewis said he was a member of the Committee; and, from the reports they had before them, he was convinced that gas was the better light for the school.

Mr. Dymond, in the course of his reply to the remarks on the report, said with regard to the Committee's "methods" which had been alluded to, they might have been entirely wrong and unprecedented, and altogether improper; but he suggested that if they saw a person who was blind walking in the direction of a ditch, it was their duty to call his attention to the fact, though they might not have been introduced to him. This was the line the Electricity Committee were taking. He was afraid that the light which had guided the Joint Committee in their decision was not the safe light of progress, but a "will-o'-the-wisp" which was leading them to a morass of mistaken ideas. The Electricity Committee appealed from their decision to three tribunes—first to the general practice of education authorities of the country; secondly, to the general medical opinion of the country; and, thirdly, to the public. If gas was the right thing, why was it that they found the great public schools had adopted electric lighting throughout their buildings, and why was it that the majority of technical schools had it? And if electricity was not the more healthy form of lighting, how was it that the Home Office allowed more people to work in a certain cubic space where electric lighting was used than where gas was used? With regard to the statement that medical opinion was in favour of gas, it must have been exceptional. He quoted the opinion of the Medical Officer to the Education Committee of the London County Council, who had reported that lighting by the electric glow lamp was the most perfect light for public schools. Another of the opinions which he had obtained was that of a leading ophthalmic surgeon, who practised eye surgery exclusively, and he said he had no hesitation in recommending electric light in preference to any other, and he always used it himself. Again, he submitted that public opinion was emphatically in favour of electric lighting, as hotels in the principal towns in the country advertised that it was in every room. On these three grounds, the Electricity Committee thought the Joint Committee had misdirected themselves in the matter; and they regretted that a system of lighting which was not the most efficient from a health point of view had been adopted.

New York Water Supply.—The following message, dated Jan. 30, from their New York Correspondent, appeared in "The Times" last Wednesday: "The two great divisions of the Catskill aqueduct tunnel under the Hudson River at Storm King Mountain were united to-day, when Mayor Gaynor fired the blasting charge removing the last wall of the rock between the borings. He and his party were lowered to the shaft 1100 feet below the river, and walked thence to the point where the two sections were to be joined. It is said that the floor levels of the borings and the side walls met within a fraction of an inch. The new water system, which is one of the world's greatest engineering feats, is expected to be finished by 1913, and will supply New York with 500 million additional gallons daily."

FATAL ACCIDENT TO A BECKTON WORKMAN.

At the Coroner's Court, West Ham, last Friday, an inquiry was held by Mr. Hilleary, the Coroner for the county borough of West Ham, relative to the death of George Albert Edward Anderson (34), a rope runner employed at the Beckton station of the Gaslight and Coke Company. Evidence was given by Alfred Fox, a coke filler, who was working in the coke-hole of No. 4 retort-house on the morning of the 27th ult., to the effect that he saw a light engine coming along with the deceased in front of it. When the fire-box had been filled, the deceased gave the signal to the driver of the engine to start, and stepped on to it. In doing so his foot slipped, and the back part of the engine pinned him against the wall. It had not moved more than 3 feet, and was stopped at once. Deceased had very little room, because the engine was on a curve. Walter Drake, the driver of the engine, said the space between it and the wall was some 3 or 4 feet, and between the rail of the engine and the wall about 2 feet. There was plenty of room between the engine and the wall, provided the man did not slip as he stood on the step. Mr. J. N. Reeson, the Engineer-in-Charge at Beckton, said there was at the end of the retort-house a doorway through which the engine was passing; and at the time of the accident it was halfway out. The foot-plate was enclosed by an iron plate which was 6 or 7 inches above the foot-plate. Apparently the deceased did not get on to the foot-plate, but slipped off the engine as it was passing out of the doorway, and the back buffer caught him on the hip, and pinned him to the wall. He was supposed to ride upon the engine; but witness thought it was an error of judgment to get on it at that particular time. Deceased should have waited until the engine was out of the coke-hole. He should have seen that the line was clear in front; and he probably did so, or he would not have given the driver of the engine the order to start. Witness was not on the spot at the time of the accident; but he was told that the engine was 3 or 4 feet out of the doorway. He had a great number of men who were doing just the same duty as deceased. A juryman asked whether, if another man slipped, a similar accident would happen. Witness replied that he hoped another man would not slip. The Coroner remarked that he thought the Jury might take it that if anything was required, the Company would see that it was done. Dr. C. F. Simpson, the House Surgeon at the Seamen's Hospital, to which deceased had been taken, described the injuries to which he had succumbed. The Jury returned a verdict that the deceased met with his death by accident; adding a rider to the effect that they thought there should be "more space between the rail of the engine and the wall."

YSTRADFELLTE WATER SCHEME.

Reasons for the Increased Estimates.

The Neath Rural District Council have given notice of their intention to apply to Parliament for an extension of the time specified in the Ystradfellte Water Act, 1902, for the construction and completion of the works authorized by the Act; and they also wish to be empowered to borrow additional money. In connection with the latter proposal, a document has been deposited dealing with the estimated expenditure which will have to be incurred by the Council in excess of the outlay reckoned upon in 1902. This excess is placed at £150,000.

The details of the revised estimate are accompanied by a statement from Mr. D. M. Davies, the Council's Engineer, who sets forth the reasons which have led to the estimate of 1902 (£162,309) being increased by £149,991, to £312,300. Dealing first of all with the amount required to purchase land and easements, which was estimated in 1902 at £12,389, and has now grown to £19,670, Mr. Davies states that the principal reason for the excess expenditure is that when the scheme for the Act of 1902 was before Parliament it was intended to convey materials for the works to the site partly by means of existing roads and partly by means of a temporary road to be constructed by the Council. It appeared to the Council that expense would be saved if the materials for the works and workmen employed upon the works were conveyed by a tramroad; and accordingly a tramroad was constructed. As to the tramroad, which in 1902 was estimated to cost £7381, but for which £21,292 is now required, the original intention was to construct a road over part of the distance lying between the intended reservoir and the Great Western railway. The reason for the excess of £13,911 over the 1902 estimate is that, instead of a road, a tramroad was constructed for the whole distance lying between the intended reservoir and the Great Western railway. With reference to the expense of completing the Ystradfellte reservoir, which in 1902 was estimated to cost £61,820, but is now put at £122,307 (an excess of £60,487), it has been found necessary to carry the foundations of the embankment of this reservoir to a greater depth than is usual, or than was originally anticipated; and the extra cost is almost entirely due to the foundations of the embankment. The quantity of earthwork for the embankment in the estimate of 1902 was very much less than that which was found necessary when working drawings and estimates came to be prepared. The construction of service reservoirs and tanks was estimated in 1902 to cost £11,006, but is now calculated to cost £23,174. The excess in the expenditure upon the storage tanks is mainly due to the increased capacity required to provide an adequate supply for the growing population. The increase in the cost of construction is based upon tenders received for existing works as compared with the cost of work estimated in 1902. Regarding the construction of trunk mains, estimated in 1902 to cost £44,712, but now calculated to cost £103,355, an increase of £58,643, the growth in the population of the district to be supplied has been very rapid; and the Council were advised that, in order to meet their obligations, the size of the mains leading from the intended reservoir should be considerably increased. Another reason for increasing the size of the mains beyond that originally estimated for is that an agreement to supply the Aberavon Corporation with water in bulk has been entered into; and this agreement involves the delivery of a larger quantity of water through the main from the reservoir and certain other mains.

WATER SUPPLY IN RURAL DISTRICTS.

Conference in Cambridge.

A conference on the question of the water supply of rural districts was recently held at the Guildhall, Cambridge. Sir George Fordham, Chairman of the Cambridgeshire County Council, presided. The Chairman said that, while most towns had settled the question of their water supply, it was only here and there that this had been done in rural districts. Probably before long these districts would have to face, under legislative pressure, the problem of providing adequate water supplies; and he advised them to take advantage of the present time, when they could act voluntarily.

Professor Kenwood, the Medical Officer for Bedfordshire, read a paper on "Village Water Supplies." He insisted that, quite apart from the legal obligation, it should be the chief concern of the sanitary authority to provide and maintain a suitable water supply, and yet up and down the country there were very many rural authorities who were in default in this respect. He said deliberately that public health in its fullest sense was sometimes at the lowest level in villages where the so-called vital statistics might seem by superficial thinkers to justify the crude and hasty deduction that all was well. It was comparatively seldom that village wells furnished all the year round a water supply which would be considered suitable in quality and quantity for an urban community; and it was usually polluted by sewage impurities. The remedy was a very difficult problem, and its difficulty was almost entirely one of finding the necessary money in districts where it was scarce. He suggested co-operation between villages, and the collection of rain water in storage reservoirs.

In the course of the discussion, Professor Sims Woodhead said he looked forward to a time when, if they were not very careful, their sewage disposal would be so bad that a very great number of their water supplies would be impracticable. Mr. Cranfield declared that the rural residents of to-day were better and healthier specimens of manhood than ever before. The chief difficulty in water supplies was that of distribution

Some of the speakers maintained that the question could never be satisfactorily dealt with without State aid.

MUNICIPAL WATER-WORKS OF OSAKA.

A large portion of the "Financial News" on Monday last week was devoted to Japan; and the following particulars of the water-works at Osaka were given as an example of municipal foresight and enterprise.

The source of water supply for Osaka is at Miyakoshima, Higashinari-gun, Osaka Prefecture, on the left side of the Yodo River. There are pumping-stations, settling-basins, filter-beds, measuring-wells, and two intake towers. The pipe-lines laid reached some 82 ri (1 ri = 2·44 miles); and the expenditure thereon originally totalled 2,563,270 yen. The work was commenced in August, 1892, and completed in October, 1895. In later years neighbouring boroughs were joined to the city. Consequently, in order to supply water, a plan to lengthen the pipe-lines was made. The work was commenced in September, 1900, and completed in December, 1901; thereby adding 34 ri of pipe-lines, the total expenditure thereon amounting to 907,092 yen. The total length of pipe-lines was thus increased to 120 ri, including other small additions since the completion of the first scheme.

When the first scheme was carried out, it was designed to serve a population of 600,000, and to provide for the requirements of the future increase to 800,000 by such additional work as might be required. In consequence of the growth of the population and the incorporation of the adjoining boroughs, the limits of water supply were extended. There was an indication that, even after the completion of the extension work, the quantity supplied would not meet the requirements of the city, and finally, in 1902, it became inadequate. Owing to the continued increase of consumption and the influx of the large numbers of visitors at the Fifth Domestic Exposition of Osaka in 1903, the stock of water became very short, and the supply was shut off compulsorily five times in the year. These conditions continued in succeeding years. In January, 1904, in order to provide an additional supply of water, Commissioners were appointed. They inspected the various rivers, with a view to making investigations; but, finding no good source, they concluded a gravity system would not be economical in this case. However, the population growing continuously—totalling upwards of a million in 1906—and the standard of living of the inhabitants becoming higher, the demand for water increased so greatly that, though a third scheme was carried through, it seemed probable that the supply would again be short before the completion of the work. Therefore, in order to prevent waste, measures to use meters generally were adopted, and a scheme was arranged for increasing the stock, which was to be completed in March, 1912, at an expenditure of about 9,321,000 yen. The installation of meters was finished at the end of the fiscal year 1909.

The work for the third scheme should have commenced in January, 1908; but, on account of various obstacles arising, it was quite impossible to start until two years later—consequently postponing the time of completion until March, 1914, instead of March, 1912. However, the construction of the central main line is making great progress, about eight-tenths of it having already been laid; and the western main line is expected to be ready for service in March, 1914.

To accord with the anticipated increase of population, additional water for 500,000 people can be obtained by installing more plant at the source, and putting down one pipe-line. In this way, it is expected that the Municipality will be able to supply water for 2 million people with the present plant and the extension works in hand.

Commercial Ventures, Limited, has been registered with a capital of £1000, in 4s. shares, to carry on the business of manufacturers of gas and cooking stoves, grillers, radiators, &c.; to acquire certain patents; and to adopt an agreement with H. E. Harris and Ann L. Harris.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

At the meeting of the Edinburgh and Leith Corporations' Gas Commissioners on Monday—Lord Provost Sir W. S. Brown presiding—it was resolved to place on record the sincere regret of the Commissioners at the death of Sir James Gibson, and their sympathy with Lady Gibson in her heavy bereavement. It was also agreed to put on record their regret at the death of Mr. J. S. Gibb (late Treasurer to the Commissioners), and to send an excerpt of it to his widow A minute of the Works' Committee was submitted, stating that the Engineer had been authorized, without admission of liability, to settle a claim in connection with the recent gas explosion at No. 81, Henderson Row, Edinburgh. The interim report of the Sub-Committee dealing with the question of the consumption of gas was presented, and remitted back to them for further consideration. [Extracts from the report dealing with this matter by Mr. W. R. Herring (the Consulting Engineer) were given in the "JOURNAL" last week (p. 310), and extracts from the reports of Mr. A. Masterton (the Acting Engineer) and Mr. A. Canning Williams (Treasurer and Collector) are unavoidably held over.] It was reported that the gas-rental for the six months ended October-November, 1911, amounted to £94,110; being a decrease of £8614 on the corresponding period of the previous year. It was explained that the decrease was due to the reduced charges and the smaller quantity of gas sold.

In the Falkirk Sheriff Court on Friday, judgment was pronounced by Sheriff Moffat in the action in which Robert Smith, of Middlefield Farm, Falkirk, sued the Falkirk Town Council for £45 damages in respect of loss and injury done to his crops through, it was alleged, noxious fumes and gases being continuously allowed to escape from the gas-works at Thornhill belonging to the defendants. The Sheriff found that the plaintiff's crops were not damaged by noxious fumes or gases being allowed to escape from the defendants' gas-works, and that they were not liable in reparation. He found the plaintiff liable in expenses.

The Dunfermline Town Council, at a meeting held on Monday, approved of the choice made by the Gas Committee from five sets of plans in competition for the front elevation of the proposed new gas show-rooms and workshop for the Corporation. The successful Architects were Messrs. Muirhead and Rutherford, of Dunfermline. It was stipulated in the competition that the cost of erecting the frontage should not exceed £480. For the building, a site was secured at a cost of £700; and it is not expected that the total expenditure on the building and site will be more than £2000.

On Thursday, the result of the plebiscite of the ratepayers of Falkirk as to whether a Burgh Extension Bill should be promoted was declared. Five months ago, the Falkirk Town Council promoted a similar Bill; but the preamble was found not proved. The present scheme is being promoted as a method of opposing the Linlithgow and Falkirk District Electric Lighting Order; the Town Council having been advised by Mr. Balfour Browne, K.C., that an extension is the best method of offering opposition to the Order. The result of the plebiscite was: For extension, 2560; against, 1197—majority for, 1363.

At the meeting on Thursday of the Dundee Town Council, there was a debate over the proposal by the Gas Committee that the salary of Mr. Yuill, the Gas Manager, should be increased by £100 per annum. The recommendation was opposed by Bailie Watt, who argued that the time was inopportune for such an advance. Mr. Noble seconded, remarking that until the city and its trade became more prosperous the Town Council should not advance wages to their higher-paid officials. Mr. High moved the approval of the advance being made, and pointed out that Mr. Yuill had been with them for eight years, and no advance had been made to him. He had put the gas undertaking on a sound financial basis, and had reduced the price of gas from 3s. 4d. to 2s. 2d. per 1000 cubic feet. The gas-works were worth £100,000 more than the figure at which they stood in the books. As a commercial man, if he were at the head of a private company owning the department, he would have no hesitation in paying the manager £1000. Bailie Foggie seconded, and said that in Mr. Yuill they had one of the best gas engineers in Scotland. During the time he had been in Dundee, the manufacture of gas had gone up 48 per cent.; and he had arranged the works in a magnificent way. Eventually, by 15 votes to 11, a proposal that the increase should be restricted to £50 per annum was carried.

The Highland Railway Company have now given formal intimation of their intention to oppose the Loch Ericht Water and Electric Power Order, by which the promoters seek to raise the level of Loch Ericht by an embankment or dam across the River Ericht, and increase the head of water which flows out of the loch for the purpose of generating electrical energy by water power. The Perth Town and County Councils, the Tay District Board of Salmon Fisheries, and several of the landed proprietors, are also among the objectors to the Order.

No less than 42 petitions have been lodged against the Glasgow Boundaries Order, which seeks to bring within the area of Glasgow four burghs—Govan, Partick, Rutherglen, and Pollokshaws—and certain districts in Lanarkshire, Renfrewshire, and Dumbartonshire.

At a meeting of the Special Committee of the Kirkcaldy District Committee held to-day, a discussion took place in regard to the provision of a water supply for the district. It was agreed to request the County Council to promote a Provisional Order for the transfer to, and vesting in, the Council of the water-works authorized by the Wemyss and District Water Order of 1910.

A subsidence of considerable dimensions recently took place at Glenboig, which resulted in the flooding of Garnqueen Pit, owned by Messrs. P. & M. Hurll, Limited, fire-brick manufacturers. The pit pumps were put out of action through the entrance of foreign substance; but these were quickly cleared by the engineers and set going.

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CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Feb.* 3.

During the past week there has been a very firm market, and values have continued to tend in the favour of sellers. The direct demand from consumers both in this country and abroad has shown some improvement, and although production has now about reached its maximum, all available supplies have been absorbed at full prices. The quotations at the close are £14 8s. 9d. to £14 10s. per ton f.o.b. Hull, £14 10s. to £14 11s. 3d. per ton f.o.b. Liverpool, and £14 11s. 3d. to £14 12s. 6d. per ton f.o.b. Leith. With regard to future delivery, there has not been a big volume of trade, but it is reported that £14 12s. 6d. per ton has been paid for February-April, and £14 5s. for July-December, f.o.b. good ports.

Nitrate of Soda.

The tone of this market has become stronger, and the spot prices have been advanced to 10s. 3d. per cwt. for 95 per cent. quality and 10s. 6d. for 96 per cent. quality.

LONDON, *Feb.* 5.

Tar Products.

The markets for tar products keep firm. Pitch is in fair demand; and prices are well maintained. Benzols are quiet, and several parcels have been offered for delivery over the whole of the year; but the prices asked by distillers are not obtainable at the moment. Naphthas are firm, with a fair demand. In creosote, the inquiry is still good, and prices are well maintained. Crude carbolic is a little dull at the moment, though the price keeps firm for prompt delivery.

The average values during the week were: **Tar**, 24s. to 28s. *ex* works. **Pitch, London**, 45s. to 46s.; **east coast**, 45s. 6d. to 46s. 6d.; **west coast, Clyde** 44s. 6d. to 45s., **Manchester** 44s. to 44s. 6d., **Liverpool** 44s. 6d. to 45s. 6d. **Benzol, 90 per cent., naked, London**, 10½d. to 11d.; **North**, 10d.; **50-90 per cent., naked, London**, 10d.; **North**, 9½d. to 10d. **Toluol, naked, London**, 10d.; **North**, 8½d. to 9d. **Crude naphtha, in bulk, London**, 4½d. to 5d.; **North**, 3¾d. to 4½d. **Solvent naphtha, naked, London**, 11d. f.o.b.; **North**, 10d. to 10¼d. f.o.b. **Heavy naphtha, naked, London**, 11¼d. to 1s. f.o.b.; **North**, 10d. to 10¼d. f.o.b. **Creosote, in bulk, London**, 2⅝d. to 3⅛d.; **North**, 2½d. to 2⅝d., salty; 2⅝d. to 2¾d., liquid. **Heavy oils, in bulk**, 3¼d. to 3⅜d. **Carbolic acid, casks included, 60 per cent., east coast**, 2s. 10d. to 3s.; **west coast**, 3s. **Naphthalene**, £4 10s. to £10; **salts**, 40s. to 45s., **bags included**. **Anthracene**, "A" **quality**, 1⅛d. to 2d. per unit, **packages included and delivered**.

Sulphate of Ammonia.

The inquiry is fairly good, and better prices are reported to have been paid in some quarters. Actual Beckton is quoted £14 1s. 3d. to £14 2s. 6d.; outside London makes are £13 15s.; Hull, £14 7s. 6d. to £14 8s. 9d.; Liverpool, £14 10s.; Leith, £14 10s. to £14 12s. 6d.; Middlesbrough, £14 8s. 9d. to £14 10s.

COAL TRADE REPORTS.

Northern Coal Trade.

There is still a strong demand in the coal trade; and with fuller arrivals of steamers, the shipments of coal have been heavier. In the steam coal trade, there is a fair inquiry. Best Northumbrians are from 13s. 6d. to 14s. per ton f.o.b., second-class steams about 13s., and steam smalls from 7s. 6d. to 10s. The output is fairly good; but the price varies with the prospects or fears of labour difficulties. In the gas coal trade, there is a very strong demand, as many users wish to add to their stocks; but climatic influences have interfered with shipments. Best Durham gas coals are 14s. 9d. to 15s. per ton f.o.b.; while second-class coals are from 13s. 3d. to 13s. 6d. "Wear specials" are quoted at 15s. 6d. per ton f.o.b., and are rather scarce. Gas coals at this season usually begin to show a decrease in consumption; but it is barely apparent as yet. Contracts are held back at present, in consequence of the high price of coals, and because the sea carriage in some cases is nearly double what it was a year ago. Though there are hopes that the labour dispute will be adjusted amicably, the prospect is as yet by no means settled. Coke is firmer; and the strong demand has caused some advances in the price. From 15s. 6d. per ton f.o.b. is now quoted for good gas coke.

Scotch Coal Trade.

The market generally is in a very unsettled state, and the demand for every class of fuel is pressing. The dockers' strike in Glasgow has not improved matters. Splint is in extra large demand, and at some pits has been advanced 2s. per ton as from Feb. 1. Prices may be quoted as follows: Ell, 14s. to 15s. per ton f.o.b. Glasgow, according to quality; splint, 14s. to 15s.; steam, 13s. to 13s. 6d. In the Lothians, there is a shortage of waggons. Prices may be given as Leith, f.o.b.: Best screened steam coal, 13s. per ton; washed trebles, 12s. 6d. to 13s.; washed doubles, 11s. 6d.; washed singles, 10s. to 10s. 6d.; and rough dross, 9s.

An Object-Lesson in Public Lighting.—Considerable attention has lately been given in the "JOURNAL" to the subject of the public lighting of Hampstead. The following remarks on the relative merits of gas and electricity appeared in the "Hampstead and Highgate Express" last Saturday: "An admirable object-lesson in the various forms of lighting is to be found near the Spaniards' Hotel. The Spaniards' Road is lighted by the incandescent electric lamps of the Hampstead Borough Council. Outside the old hostelry itself and in Bishop's Avenue are gas-lamps of the old flat-burner type. Beyond the avenue, Hampstead Lane is lighted by the Hornsey Borough Council with upright incandescent mantle lamps. But between the avenue and the Spaniards' Hotel the lane, which is there in the parish of Finchley, is lighted by a number of incandescent gas-lamps with inverted mantles, each of which gives a light far in excess of any of the others, and probably greater than any two of the others put together."

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Important Sale of Gas Stocks.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, there was a large attendance of bidders for the various stocks which were to be offered for sale by Messrs. A. & W. Richards. The first lots consisted of property to be disposed of by direction of the Senior Official Receiver and Liquidator of the Birkbeck Permanent Benefit Building Society. A £300 bond (10 per cent.) of the Gaslight and Coke Company fetched £741; the purchaser taking the interest accruing from the 1st ult. A number of 3½ per cent. mortgage debentures of the British Gaslight Company (Hull and Norwich stations) were placed at £82 to £82 10s. per £100, *cum div.* from the 1st ult. One of the lots of the Norwich debentures was sold by direction of the Senior Official Receiver and Liquidator of the Second Birkbeck Permanent Benefit Building Society, as was £2115 of consolidated stock of the Hornsey Gas Company, ranking for a standard dividend of 7 per cent., subject to the sliding-scale, but carrying 9½ per cent. It was sold at £195 10s. to £200 per £100 of stock. The next lots were offered by order of executors. Some consolidated ordinary stock of the Isle of Thanet Gas Company, ranking for a standard dividend of 3½ per cent. (present dividend, paid free of income-tax, equal to £5 16s. 9d. per cent. less tax), was sold at £129 to £130 per £100; and some 5 per cent. debenture stock of the Company, at £120 per £100. Some "A" stock of the Broadstairs Gas Company (standard dividend 10 per cent., but present rate equal to £10 12s. 6d. per cent., less tax), fetched £200 to £201 per £100; and some "B" and new "B" stock 7 per cent., but present distribution equal to £7 8s. 6d., less tax), at £133 to £135. Small quantities of 5 per cent. preference and perpetual debenture stocks (present dividend equal to £5 6s. 3d. per cent., less tax) realized £108 per £100 for the former and £116 per £100 for the latter. By order of trustees, some 4 per cent. consolidated preference stock of the Aldershot Gas, Water, and District Lighting Company was offered for sale; and it fetched from £92 to £92 10s. per £100.

Gas Manager's Daughter Drowned.—There was a sad fatality at Downpatrick on Saturday, when, through the breaking of the ice on which she was playing hockey, Miss Florrie Mearns lost her life, though several other girls who were at the same time immersed, were rescued. She was 20 years of age, and was the daughter of Mr. C. W. Mearns, the Manager of the Downpatrick Gas Company.

Fleetwood Gas Bill to be Opposed.—The Bill which the Fleetwood Gas Company have promoted to obtain powers for the construction of a gasholder and other works on land near the existing gas-works is to be opposed by the Lancashire County Council. The site of the proposed holder is close to a piece of vacant land purchased by the local Education Committee with a view to the erection of an elementary school; and the provided school managers have reported that the erection of the works will detrimentally affect the value of the land owned by the Committee.

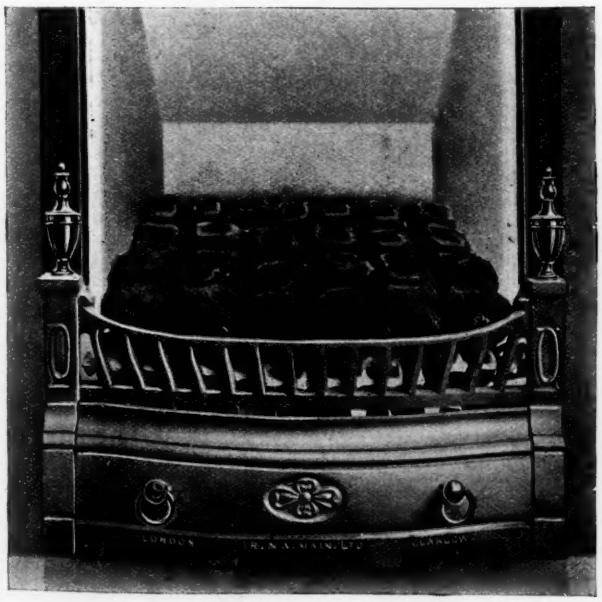
York Corporation and the Gas Company's Bill.

The Gas Committee of the York Corporation have issued a special report on the Gas Company's Bill, and say they feel that the Corporation are fully justified in taking all necessary steps to oppose the measure, which "will be detrimental to the Corporation and to the consumers in the city if passed in its present form." Mr. E. H. Stevenson has prepared a report on the Bill; and after dealing with its provisions, he remarks that the only way in which consumers could be insured for the future against a similar attempt to increase the dividend, or to unduly extend the limits of supply, would be by the Corporation obtaining a clause in the Act enabling them to promote a Bill in the next session of Parliament for the purchase of the undertaking. The Company, Mr. Stevenson says, have come to the end of their tether, and admit that they cannot raise any further share capital under the existing Acts. The amount of capital expended in proportion to the gas sold is small, and shows that the Company have spent considerable sums on capital account out of revenue. If the city does not take over the undertaking now, there can be no doubt the Company, working under the sliding-scale (instead of a maximum dividend), will be able to increase the profit, and therefore the dividend, simply by not using the revenue for capital purposes. In this case, the value of the undertaking would be proportionately increased if in the future the city were to purchase it. Under these circumstances, the Corporation would be well advised to use their best endeavours to obtain a purchase clause sterilizing the new capital that may be granted, and stereotyping the value of the undertaking as it is to-day. Mr. Stevenson also points out that if the Company obtain powers over the large area proposed, and lay down mains to the various villages, this will entail an increased price of gas in York, and will prevent a reduction which would otherwise soon eventuate.

Sidmouth Gas and Electricity Works Purchase.—A poll of the ratepayers has been taken on the proposal of the Sidmouth Urban District Council to purchase the local gas and electricity works. The number of votes recorded in favour of the scheme was 555; and of those against it, 303.

Abandonment of an Electric Light Scheme.—At a meeting of the promoters of the Lytham Electric Light and Power Company, Limited, on Wednesday last, it was stated that only 21 applications had been made for shares, representing £1357, and including the £200 subscribed by each of the three provisional Directors. The previous week the public were appealed to for a subscription of £10,000 in £1 shares, for the purpose of putting down plant to supply Lytham with electric current. Mr. J. Marcus Rea, who presided at the meeting of the promoters, said that if £6250 had been subscribed they would have gone to allotment. In face of the meagre response the promoters felt, though very reluctantly, that they had no option but to decide that the scheme could not go forward.

In the Matter of Appearance.



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Manchester Finance Committee and Departmental Expenditure.

At the next meeting of the Manchester City Council, the Finance Committee will present a scheme drafted with the object of exercising a more stringent supervision over the expenditure in the different departments. It had been suggested that the position of the Finance Committee should be somewhat similar to that of the Treasury with regard to national expenditure; and on this point the Committee in their report say: "The Council will be aware that the Treasury have power to veto the proposals of the departments. In other words, if the Treasury object, there is an end of the matter—no provision can be made in the estimates. There is no desire on the part of the Finance Committee to take up such a position; the ultimate responsibility for all expenditure must rest with the Council. But the Council's decision should only be given upon a full consideration of all the facts, financial and otherwise." The Committee express the opinion that a distinct line should be drawn between the approval of expenditure and the approval of the annual estimates. Only such expenditure as has been approved by the Council should be included in the estimates, except in very special cases. The recommendations of the Committee, therefore, fall under the following heads: (*a*) Relating to new proposals or to additional expenditure; and (*b*) supervision of expenditure. In the view of the Committee, all new proposals for expenditure or increased expenditure should be brought more prominently before the Council.

Melbourne Metropolitan Gas Company.—Messrs. John Terry and and Co., the London Agents for the Company, have received a cable advice that the profits for the half year to the 31st of December last were £105,000. A dividend of 5s. per share has been declared for the half year, a sum of £52,500 added to the reserve fund, and a balance of £14,850 carried forward.

Non-Unionist Assaulted at Beckton.—At the West Ham Police Court a few days ago, Edward Gallagher was charged on remand with causing grievous bodily harm to Robert Harvey, and also with assaulting him. Harvey, who walked with the aid of a stick, said he was a machine-minder at the Beckton Gas-Works, and the accused was employed there in a similar capacity. At about one o'clock on the morning of the 21st of January, they were working in a retort-house, and the foreman ordered witness to take charge of Gallagher's machine. Accused then got off his machine, and witness was working it when he felt a blow behind the left ear, and heard Gallagher address him in violent language as a non-union man. The force of the blow knocked witness into a coke hole, and accused then jumped down on to him. They struggled, and some other workmen pulled the accused away. The witness became unconscious, and did not remember anything more until he found himself in the Seamen's Hospital. For the defence, it was stated that the accused had been drinking, and was very sorry for what had occurred. He was fined £5 or a month's imprisonment.

Ilkley Water Supply.—An inquiry was held at Ilkley last Friday, by Dr. Brightmore and Dr. Maceuen, on behalf of the Local Government Board, in respect of the Council's application for sanction to borrow £2100 for water-works purposes. Of this, £1140 is to be expended on the extension of mains, and £960 in the construction of mechanical filters and the substitution of iron pipes for the present earthenware pipes conveying water from the springs to Ghyll Head reservoir. It was stated that the reservoir was built at a cost of £1400, the balance of a sum of £12,000 sanctioned by the Board in 1893; but this particular work was not mentioned at the time of the inquiry. There were complaints of peaty matter getting into the water—probably as the result of fractures in the earthenware pipes, which collected from a soft boggy ground—but the Medical Officer of Health said that, in his opinion, this would be entirely obviated by the use of iron pipes.

Proposed Charge for Street Lighting in Lancaster.—A proposal by the Gas Committee (which was, however, referred back for further consideration) was the subject of a lengthy debate at the monthly meeting of the Lancaster Town Council. It has been the custom to provide gas for public lighting without making any charge to the Lighting Committee—so as to keep within an Order requiring them to limit the expenditure upon lighting the town to 4d. in the pound on the rates. But with the advent of a system of Local Government Board audit, the Gas Committee feel that it will be necessary to alter this arrangement. Having learnt from Mr. Charles Armitage, the Gas Engineer, that the cost of labour and materials in the manufacture of gas is about 9¾d. per 1000 cubic feet, and that including sinking fund and interest the total cost came to 1s. 4d. per 1000 feet, they suggested that the charge to the Lighting Committee for the gas they require should be 1s. net per 1000 cubic feet. The opinion of the members who spoke seemed to be that the Lighting Committee should be charged at any rate the cost price of the gas they consumed.

Burning Accidents to Children.—At a meeting of the General Purposes Committee of the Belfast Borough Council, attention was called to burning accidents caused by unguarded fires and gas-rings. The Committee had explained to them steps being taken by the Gas Manager in respect of the gas-rings, of which there are a very great number in use; and these were considered satisfactory. When the matter came before the Council, Alderman Sir James Henderson said he thought it might be well to stop the use of these gas-rings altogether. Dr. Williamson, however, remarked that it had been pointed out to them that there had been no specific case of accident due to the rings. The Lord Mayor (Mr. R. J. M'Mordie, M.P.) added that the Gas Committee intended to make some alterations in the rings which would render it impossible for them to be used on the floors. Mr. Riddell said the evidence showed that most of the accidents were due to open fireplaces. It had been stated that there were 50,000 gas-rings in operation in the city; and even if a number of accidents occurred from their use, the proportion of fatal accidents were exceedingly small in comparison with the larger number due to open fires.

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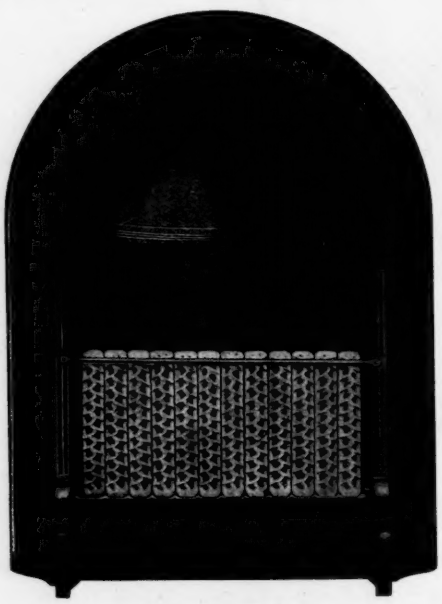

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The "OLAK."

The Improved Lighting of the City of London.

Referring to this matter last Saturday, the "City Press" said: "The advantage of the new lighting contracts entered into by the Corporation is reflected, to use an appropriate word, in the estimates. For the current year the outlay on gas is estimated at £10,537, and on electric light at £11,595; whereas for the ensuing twelvemonth the figures appear at £7450 and £8350 respectively—a net gain of £6328. Mr. Gunton and his colleagues of the Streets Committee right worthily have earned our thanks." The Streets Committee of the Corporation, who deal with the public lighting of the City, have elected as their Chairman for the ensuing year Mr. Gordon Stanham, F.R.I.B.A., of Bush Lane, Cannon Street. Mr. Stanham, it may be recollected, was one of the five members of the deputation from the Common Council, who visited the Continent in 1909 to inspect the public lighting of various cities. The whole of these members have occupied the chair of the Committee; the last to retire being Mr. Josiah Gunton, also an architect, who filled the position for two years, and brought to a successful issue last November the report for relighting the City.

Gas Poisoning Fatality at Birmingham.—At an inquest in Birmingham on the body of a man named Savage, who had apartments in Coleshill Street, it was stated that deceased (who had not been well) was found dead in bed, with the place full of gas. There was a gas-stove in the room, the tap of which was on full; but the ordinary gas-jet had been turned off. The Coroner said there was nothing which seemed to point to deceased having taken his own life; and the Jury returned a verdict of "Accidental death."

Explosions of Gas.—The Flying Horse Hotel, Kegworth, was wrecked by a gas explosion shortly before midnight last Thursday. There was a smell of gas in the house at closing-time, and the wife of the landlord, accompanied by a maid, found there was an escape in the dining-room. They left the room door open for a quarter of an hour, and then returned with a light, when an explosion followed, which blew out the front of the house, and caused injuries to the two women. The escape was from the chandelier pipe, which had been cracked by the frost. A gas explosion occurred in an unoccupied shop in Essex Road, Islington, soon after noon last Friday, and caused considerable damage to property. The windows were blown out, and flames burst forth. A man who was driving past on a waggon was thrown to the ground by the shock, a boy who was sitting on the rear of the van fell off, and the horse was scorched by the flames. The Fire Brigade were at once summoned and the fire was speedily subdued. Five or six large plate glass windows in the premises of Messrs. Peck, drapers, opposite were smashed, as well as those of adjoining shops on either side of them. The explosion originated on the ground floor. It appears that some workmen had been engaged in the shop in the morning; but at the time of the occurrence there was no one on the premises, and the place was locked.

Cheltenham Water Supply.—A Local Government Board inquiry has been held in Cheltenham with respect to the Corporation's application for sanction to borrow £1750 for additional sand filter construction at their pumping-station as Tewkesbury. It was stated that the Corporation had power to draw 3 million gallons of water a day, but only had capacity for filtering 600,000 gallons. They were providing for roughing filters out of revenue; but the loan was for ordinary cement construction or alternatively ferro-concrete construction. No opposition was offered.

Felixstowe Water Purchase Proposal Rejected.—There has been considerable excitement in Felixstowe over the proposal of the Urban District Council that the local water-works should be acquired; and when the statutory meeting of ratepayers was held on Jan. 12 to consider the Purchase Bill, the motion in favour of proceeding with the measure was lost, and a poll was demanded. This was taken on Jan. 31; and between the two dates named, seven other meetings of the ratepayers took place, at which views both for and against the scheme were put forward. The result of the poll was: Against purchase, 679; and in favour of it, 337—majority against, 342. The actual voting strength is stated to be about 1600; and it will be seen that of these just over 1000 polled. In fact, the belief is that it constituted a "record" poll for Felixstowe. Last Thursday the Council met, and agreed that the Bill be withdrawn. The Chairman (Mr. E. H. Woodmancy) resigned his position; and, in doing so, said that some water shares which he had held had been sold by him, and the proceeds (£225) he had handed over to help discharge the cost to which the town had been put over the abortive Bill. Mr. Woodmancy was urged to reconsider his decision to resign, and assured that he had the sympathy of the majority of the Council.

The Lighting of Kings Kerswill.—The Newton Abbot Rural District Council had before them recently a letter from the Town Clerk of Torquay, with reference to the proposed lighting of the village of Kings Kerswill by gas. The letter stated that the Torquay Corporation had made application to the Local Government Board for a Provisional Order, in connection with the St. Mary Church Local Government Act, 1868, so as to include the parish of Kings Kerswill within the limits of the Corporation supply of gas. The origin of the proposal dated from an inquiry made by the Parish Council as to whether the Corporation would extend their mains to Kings Kerswill; and though a majority of the present Parish Council were apparently averse to the adoption just now of the Lighting and Watching Act for the parish, it yet appeared that a large number of inhabitants were desirous of obtaining a supply of gas for private lighting. Mr. Brown moved that the District Council should oppose the application. He said that, if Kings Kerswill wanted gas, it could obtain it from Newton Abbot on practically the same terms as from Torquay. He did not think they should allow the Corporation to come in; for it might lead to the annexation of the parish. The Chairman thought the matter ought to be considered by the Parish Council; and it was decided to refer it to this body.

FOR

The Cold Weather

NOTHING CAN BE COMPARED WITH THE

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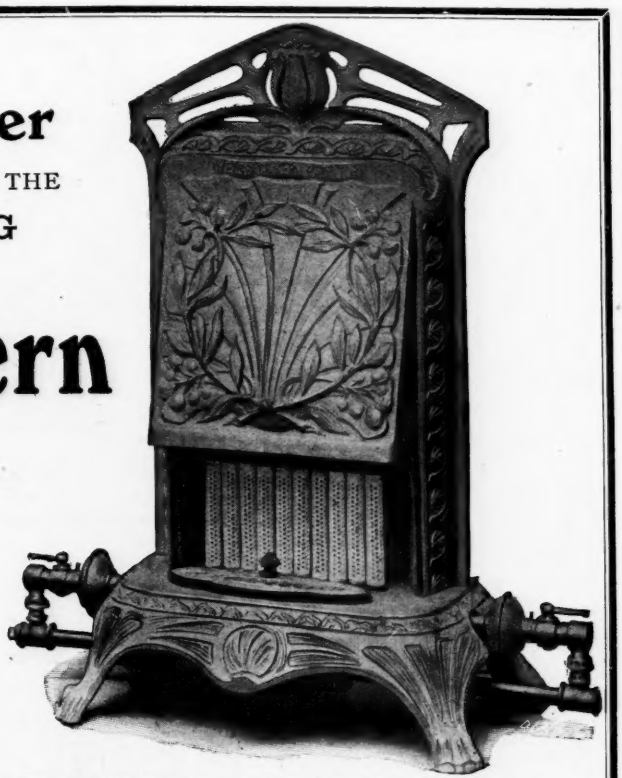

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Gas Companies as Chemical Manufacturers.

Referring to this matter in the number for last Saturday, the Editor of the "Chemical Trade Journal" said: "The apt remarks which follow Mr. William Pearce's letter in the last issue of the 'JOURNAL OF GAS LIGHTING' [p. 300] constitute a full and complete reply to the agitation of the Chemical Trade Section of the London Chamber of Commerce against the purchasing powers of gas companies. We are afraid we cannot assist our chemical friends in London on any question of principle. The 'point of substance' which Mr. Pearce raises cannot, by any way of reasoning, be developed to a principle; but it seems pretty clear to us that the term 'purchase' is already implied in the general purposes clauses. What gives point to the agitation is that a new spirit of electrical development in order to secure further economical advantages in almost every industry is putting a keen edge upon the powers of the gas companies. We can only reiterate what we said last week—that the private chemical manufacturer will be compelled to modify his works, and adapt himself to changed conditions."

It is announced that a reduction of 3d. per 1000 cubic feet is being made by the Ascot District Gas Company in the price of their gas, which will be brought down to 4s. The Yorktown and Blackwater Gas Company have reduced their price from 3s. 6d. to 3s. 4d., and have increased the allowance to slot-meter consumers from 2d. to 4d. per 1000 cubic feet. An announcement has been made by the Sutton Gas Company that, as from Jan. 1, there will be a reduction of 2d. per 1000 cubic feet in the price of gas—bringing the charge down to 2s. 6d.

The annual dinner of the staff of the Bryan Donkin Company, Limited, was held at Chesterfield on the 26th ult. It was the fourth of the series, and was much appreciated by the large attendance. The Managing-Director (Mr. Councillor George Clark) presided. The toast of "The Bryan Donkin Company, Limited," was proposed by Mr. W. A. Hopkins, who commented upon the cordial relations existing between the Company and the staff, and referred to the increase in their number as bearing testimony to the expansion of the business. Mr. H. J. Donkin responded, and, in an interesting speech, compared the varied conditions of life in the century from 1812 to 1912, and alluded to the remarkable part which engineering had played in this period. Mr. N. W. Burbidge proposed "The Managing-Director." Mr. Clark replied, and proposed "The Staff"—thanking them for the loyalty they had displayed. The toast was responded to by Mr. T. H. Haigh, Mr. W. V. Haslam, and Mr. P. Henchcliffe. Other toasts were "The Representatives" and "The Artistes." Votes of thanks were accorded to the Directors for their hospitality, and to the Chairman for presiding. A programme of music was contributed to by members of the staff and by Mr. Councillor Lancaster, who conducts the Bryan Donkin orchestra.

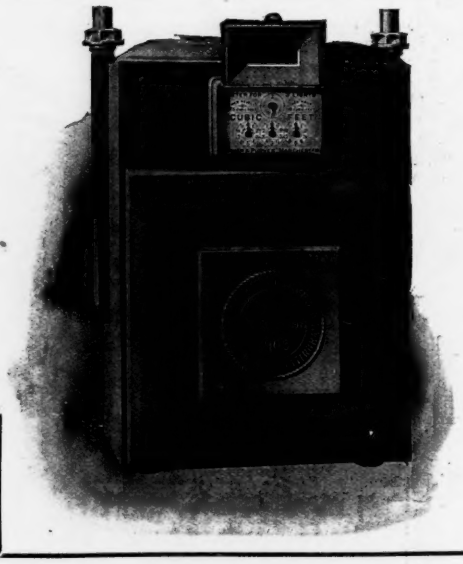
On Monday of last week, there was a slight outbreak of fire at the Eastcroft Gas-Works of the Nottingham Corporation in connection with one of the coal-elevators. An explanation of the occurrence was that some coal-dust had somehow become ignited. The flames were extinguished by the fire brigade before any great amount of damage had been done.

Out of last year's profits on the gas undertaking (£18,632), the Coventry Corporation voted £14,000 for the cost of new purifiers. At the last meeting of the Town Council, the question was raised by one member as to why there was so much sulphur in the gas. The reply was that numerous experiments had been made, and it had been found advisable to return to the old system of lime purification, which would be carried out in the immediate future. The explanation was regarded as satisfactory.

APPLICATIONS FOR LETTERS PATENT.

1687.—GOODMAN, R., "Testing gas." Jan. 22.
1722.—WALKER, G., and JAQUES, C. E. S., "Mantles." Jan. 22.
1724.—DAINESI, A. C., "Gas-fittings." Jan. 22.
1756.—ROW, R. R., "Pipe-joints." Jan. 22.
1884.—STOVE, A. E., and ATKINSON, T. N., "Acetylene generators." Jan. 24.
1907.—LEWIS, G. M., and TURNBULL, J., "Slot-meters." Jan. 24.
1924.—KRAUSS, F., BRUCKNER, F. V., and LUDWIG, E., "Gas-oxygen burner." Jan. 24.
1925.—KRAUSS, F., BRUCKNER, F. V., and LUDWIG, E., "Gas-generator." Jan. 24.
1975.—FROST, A. C., and WRIGHT, A. C., "Lighting and extinguishing gas-lamps." Jan. 24.
1992.—ROBERTS, E., "Liquid for the treatment of coal, coke, or any other fuel." Jan. 25.
2032.—WALKER, G. M., "Acetylene generator." Jan. 25.
2054.—SMITH, E. W., "Coin-freed meters." Jan. 25.
2083.—FOWLER, C., "Receiving the products of combustion from gas-burners." Jan. 26.
2093.—JOHNSON, G. W., "Removal of carbon disulphide from gases." A communication from the Athion Ges.m.b.H. Jan. 16.
2100.—ADAMS, A. H., "Taps." Jan. 26.
2147.—BIHELLER, S., "Globe support." Jan. 26.
2149.—EBERHARD, O., "Removing carbolic disulphide from gases." Jan. 26.
2190.—FORSTER, J., "Treating waste liquors." Jan. 27.
2203.—ALTMAN, I., "Mantle-supports." Jan. 27.
2220.—HILL, R. P., "Cleaning water-pipes." Jan. 27.
2232.—AKTIEBOLAGET LUX, "Lighting and extinguishing gas-lamps." Jan. 27.

DRY GAS METERS.



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TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Feb. 3. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.	
					Liverpool.	Manchester.
Tar, crude	per ton	—	24/- 28/-	24/- 28/-	—	24/- 27/6
Pitch	„	45/-	45/-	45/3	—	—
Benzol, 90%	per gallon	1/1	-/11⅜	1/-	1/-	1/-
Benzol, 50-90%	„	—	-/11¼	-/11	-/11	-/11
Toluol, 90%	„	—	-/11	-/11	—	—
Crude naphtha, 30%	„	—	-/5	-/4½	-/5	-/5
Light oil, 50%	„	—	-/4⅜	—	-/4⅜	-/4⅜
Solvent naphtha, 90-160	„	—	-/11	-/10½	—	-/10¼
Heavy naphtha, 90-190	„	—	-/11	-/11	—	-/11¼
Creosote in bulk	„	—	-/2⅝	-/2 9/16	-/2⅝	-/2⅝
Heavy oils	„	—	-/2⅜	-/2⅛	—	-/2⅝
Carbolic acid, 60's	„	—	3/- 3/1½	3/-	—	—
Naphthalene, crude drained salts	per ton	—	45/-	42/6	47/6	50/-
„ pressed	„	—	60/-	63/-	60/-	60/- 75/-
„ whizzed	„	—	—	—	70/- 72/6	65/- 75/-
Anthracene	per unit	-/2	-/1½	-/1½	-/1¼	-/1¼

GAS COMPANIES' STOCK AND SHARE LIST.

The week just closed on the Stock Exchange was not pregnant with any moving incident or important factor; but it had some gratifying features. Not that business was as brisk as could be desired, owing in some measure to the settlement of the long account, which operation was not concluded without one disaster. But the steady demand for Consols and other gilt-edged investments was welcome; and Home Rails, though not quite immune from oscillation, were firmer. The opening day was quiet, but fairly good in tone. Consols were unchanged; but Rails moved up in response to more cheerful views of the colliers' unrest. Americans were nervous of dividend reductions. The tone improved on Tuesday. There was a good demand for Government issues, Consols rose ⅛, Rails had a moderate advance, and Americans steadied. On Wednesday, things were rather more active. Consols gained another ¼, and Rails were strong and rose freely; but Americans were very bad. On Thursday, the tone was less cheerful. Government issues were only moderate, Rails hesitated and fell back, and the rest were not over bright. Business became almost torpid on Friday, and Rails were quite dull. But the gilt-edged division was in good demand, and Consols rose ¼. Americans recovered somewhat. On Saturday, business was quiet enough; but the tone was not bad. Consols went up ¼, closing at 77¾-78—a rise of ⅝ in the week. Rails were better pleased with the outlook of labour questions; and Americans were calm. In the Money Market, there was a good demand, and discount rates were firm. Business in the Gas Market was a good deal quieter; but the market was very strong, and several issues advanced their quotations. The Companies' accounts continue to show that they did very well in the last half of 1911, in spite of the mild weather of December; and, now that winter has come sharply upon us at last, good promise is afforded of increased sales in the current half year. In Gaslight and Coke issues, the ordinary was very moderately dealt in, but at higher prices—ranging from 106¼ to 107; and the quotation rose ¼. In the secured issues, the maximum was done at 85⅜ to 86½, the preference at 105 (a rise of 1), and the debenture at 79¼ to 80. South Metropolitan was quiet and firm, changing hands at 116¼ to 117¼; and the debenture was done at 78¼ to 78⅝. In Commercials, the 4 per cent. marked 110⅜ and 111½, the 3½ per cent. 105, and the debenture 75 and 75⅜. Among the Suburban and Provincial group, Alliance and Dublin was done at 79¼ to 81, British at 45½ and 45⅝, and Ilford "A" and "C" at 156. On the local Exchange, Newcastle was done at 104—a rise of 1. Bromley and Crays issues had a further advance in view of the projected amalgamation; but no business was marked in them. In the Continental companies, Imperial changed hands at 190¾ to 191½, ditto debenture at 90⅜, Union at 83 to 84½ (a rise of 1), ditto preference at 133 and 134, and European at 20⅜ and 21 *ex div.* Among the undertakings of the remoter world, Cape Town preference realized 5, Bombay 6½, Monte Video 12⅛, Primitiva from 7¼ to 7⅝, ditto preference from 5 9/32 to 5 11/32, and San Paulo 11 1/16 and 11⅛.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 12	5	Alliance & Dublin Ord.	79—82	..	6 1 11
374,000	Stk.	Jan. 12	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
250,000	5	Sept. 28	7	Bombay, Ltd.	6—6½	..	5 7 8
50,000	10	Aug. 31	15	Bourne-) 10 p.c.	29—30	..	5 0 0
311,810	10	„	7	mouth Gas) B 7 p.c.	16½—16⅝	..	4 3 7
75,000	10	„	6	and Water) Pref. 6 p.c.	14½—14⅝	..	4 1 4
380,000	Stk.	Aug. 16	13	Brentford Consolidated	257—262	..	4 19 3
330,000	„	„	10	Do. New	198—203	..	4 18 6
50,000	„	„	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	„	Dec. 14	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	217—222	..	4 19 1
246,320	„	„	8	Do. A Ord. Stk.	157—160	..	5 0 0
490,000	20	Sept. 28	12½	British	44½—45½	..	5 9 11
120,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. Stk.	92—94	..	4 5 1
109,000	„	Aug. 16	6	Bromley, A 5 p.c.	129—134	+2	4 9 7
165,700	„	„	4½	Do. B 3½ p.c.	100—103	+2	4 7 5
82,278	„	„	5½	Do. C 5 p.c.	120—125	+3	4 8 0
55,000	„	Dec. 29	3½	Do. 3½ p.c. Deb.	80—82	..	4 5 4
250,000	Stk.	„	4	Buenos Ayres 4 p.c. Deb.	94—96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4½—5½	..	—
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	76—80	..	5 12 6
157,150	Stk.	Aug. 16	5	Chester 5 p.c. Ord.	111—113	..	4 8 6
1,513,280	Stk.	„	5/9/4	Commercial 4 p.c. Stk.	110—112	..	4 17 7
560,000	„	„	5⅛	Do. 3½ p.c. do.	105—107	..	4 19 8
475,000	„	Dec. 14	3	Do. 3 p.c. Deb. Stk.	75—77	..	3 17 11
800,000	Stk.	„	4	Continental Union, Ltd.	82—85	+1	4 14 2
200,000	„	„	7	Do. 7 p.c. Pref.	132—134	..	5 4 6
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	„	—	4	Do. Deb. Stk.	104—105	..	3 16 2
840,150	10	Jan. 31	10	European, Ltd.	20—21*	..	4 15 3
16,160,600	Stk.	Aug. 16	4/14/8	Gas-) 4 p.c. Ord.	106—107	+½	4 8 5
2,600,000	„	„	3½	light) 3½ p.c. max.	85—87	..	4 0 6
4,062,235	„	„	4	and) 4 p.c. Con. Pref.	103—105	+1	3 16 2
4,531,705	„	Dec. 14	3	Coke) 3 p.c. Con. Deb.	79—81	..	3 14 1
258,740	Stk.	Sept. 14	5	Hastings & St. L. 3½ p.c.	95—97	..	5 3 1
82,500	„	„	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	17—17½	..	6 5 9
131,000	Stk.	Sept. 14	7½	Ilford A and C	154—157	..	4 15 6
65,780	„	„	6	Do. B	125—128	..	4 13 9
65,500	„	Dec. 29	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
4,940,000	Stk.	Nov. 10	9	Imperial Continental	190—192	..	4 13 9
1,235,000	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	90—92	..	3 16 1
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	125—130	..	4 12 4
561,000	Stk.	Aug. 16	10	Liverpool United A.	219—221	..	4 10 6
718,100	„	„	7	Do. B.	163—165	..	4 4 10
306,083	„	Dec. 29	4	Do. Deb. Stk.	100—102	..	3 18 5
75,000	5	Dec. 14	6	Malta & Mediterranean	4⅜—5	..	6 0 0
560,000	100	Oct. 2	5	Met. of) 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	„	4½	Melbourne) 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 10	3½	Monte Video, Ltd.	12—12½	..	5 12 0
1,775,892	Stk.	July 28	4½	Newc'tle&G'tesh'd Con.	103—105	+1	4 3 4
529,705	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	85—87	..	4 0 6
55,940	10	Aug. 31	7/7/0	North Middlesex 7 p.c.	14⅛—15½	..	4 14 10
300,000	Stk.	Dec. 14	8	Oriental, Ltd.	136—138	..	5 15 11
60,000	5	Sept. 28	8	Ottoman, Ltd.	6⅞—7¼	..	5 10 4
31,800	53	Aug. 16	13	Portsea Island A	140—145	..	4 14 10
60,000	50	„	13	Do. B	133—138	..	4 14 2
100,000	50	„	12	Do. C	130—135	..	4 8 11
398,490	5	Oct. 12	8	Primitiva Ord.	7½—7⅞	+⅛	5 3 3
796,980	5	Dec. 29	5	Do. 5 p.c. Pref.	5⅛—5⅝	..	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
312,650	Stk.	Dec. 29	4	River Plate 4 p.c. Deb.	94—96	..	4 3 4
250,000	5	Sept. 28	12	San Paulo, Ltd.	10⅜—11¼	..	5 6 8
115,000	10	„	6	Do. 6 p.c. Pref.	11½—12	..	5 0 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—50	..	5 0 0
135,000	Stk.	Aug. 31	10	Sheffield A	240—242	..	4 2 8
209,984	„	„	10	Do. B	239—241	−1	4 3 0
523,500	„	„	10	Do. C	239—241	−1	4 3 0
90,000	10	Sept. 28	6	South African	8—9	..	6 13 4
6,429,895	Stk.	Aug. 16	5/9/4	South Met., 4 p.c. Ord.	116—118	..	4 12 8
1,895,445	„	Jan. 12	3	Do. 3 p.c. Deb.	78—80	..	3 15 0
209,820	Stk.	Aug. 16	8½	South Shields Con. Stk.	157—159	..	5 6 11
605,000	Stk.	„	5/16/8†	S'th Suburb'n Ord. 5 p.c.	122—124	..	4 14 0
60,000	„	„	5	Do. 5 p.c. Pref.	117—120	..	4 3 4
117,058	„	Jan. 12	5	Do. 5 p.c. Deb. Stk.	119—121	..	4 2 8
502,310	Stk.	Nov. 10	5	Southampton Ord.	107—109	..	4 11 9
120,000	Stk.	Aug. 16	7½	Tottenham) A 5 p.c.	145—148	..	4 16 3
483,940	„	„	5⅝	and) B 3½ p.c.	115—117	..	4 16 1
149,470	„	Dec. 29	4	Edmonton) 4 p.c. Deb.	94—96	..	4 3 4
182,380	10	„	5	Tuscan, Ltd.	8½—9	..	5 11 1
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
236,476	Stk.	Aug. 16	5	Tynemouth, 5 p.c. max.	114—116	..	4 6 2
255,636	Stk.	Aug. 31	6⅞	Wands-) B 3½ p.c.	143—146	..	4 14 3
85,766	„	Dec. 29	3	worth) 3 p.c. Deb. Stk.	71½—73½	..	4 1 8

Prices marked * are "Ex. div." † Next dividend will be at this rate.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Airdrie Gas Undertaking. Applications by Feb. 10.
DRAUGHTSMAN. Sunderland Gas Company.
REPRESENTATIVE (Gas Furnaces). No. 5519.
REPRESENTATIVE. Sutherland Meter Company, Birmingham.
CHEMICAL PLUMBERS. Joseph Taylor and Co., Bolton.
FITTER. Glastonbury Gas Department.

Appointments Wanted.

CHEMIST (Analytical Tests). R. Walker, Farnley.
CHEMICAL PLUMBER, &c. No. 5492.
ENGINEERING OR CLERICAL DEPARTMENT OF GAS COMPANY. No. 5520.
MANAGER OR SUPERINTENDENT. No. 5518.

Patent Licences, &c.

GASHOLDER, &c. W. P. Thompson and Co., Liverpool.

Sales of Stocks and Shares.

CREDITON GAS COMPANY. By Auction. Rougemont Hotel, Exeter. Feb. 23.
SOUTHEND WATER COMPANY. By Auction, at the Mart. Feb. 20.

Meetings.

BRIGHTON AND HOVE GAS COMPANY. 5, Great Winchester Street, E.C. Feb. 23. Two o'clock.
ENFIELD GAS COMPANY. Sydney Road, Enfield. Feb. 29. 5.30 o'clock.
HORLEY GAS COMPANY. Great Eastern Hotel. Feb. 28. 3.15 o'clock.
SOUTHGATE GAS COMPANY. 5, Great Winchester Street, E.C. Feb 22. 3.45 o'clock.
UXBRIDGE GAS COMPANY. 162, High Street, Uxbridge. Feb. 23. 2.30 o'clock.

TENDERS FOR

Brass Goods, &c.

HALIFAX GAS DEPARTMENT. Tenders by Feb. 10.

Fire-Clay Goods, &c.

BANGOR (Co. DOWN) URBAN DISTRICT COUNCIL (Resetting, &c.). Tenders by Feb. 16.
HALIFAX GAS DEPARTMENT. Tenders by Feb. 10.

General Stores (Oils, Paints, &c., Sulphuric Acid, Lime, Ironmongery, Brushes, Gaskin, &c., Steel Goods, &c.).

HALIFAX GAS DEPARTMENT. Tenders by Feb. 10.

Meters, &c.

HALIFAX GAS DEPARTMENT. Tenders by Feb. 10.

Oxide (New and Spent).

HALIFAX GAS DEPARTMENT. Tenders by Feb. 10.

Pipes, Valves, &c.

HALIFAX GAS DEPARTMENT. Tenders by Feb. 10.
PLYMOUTH CORPORATION. Tenders by Feb. 22.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, the charge is 25s. a year.
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